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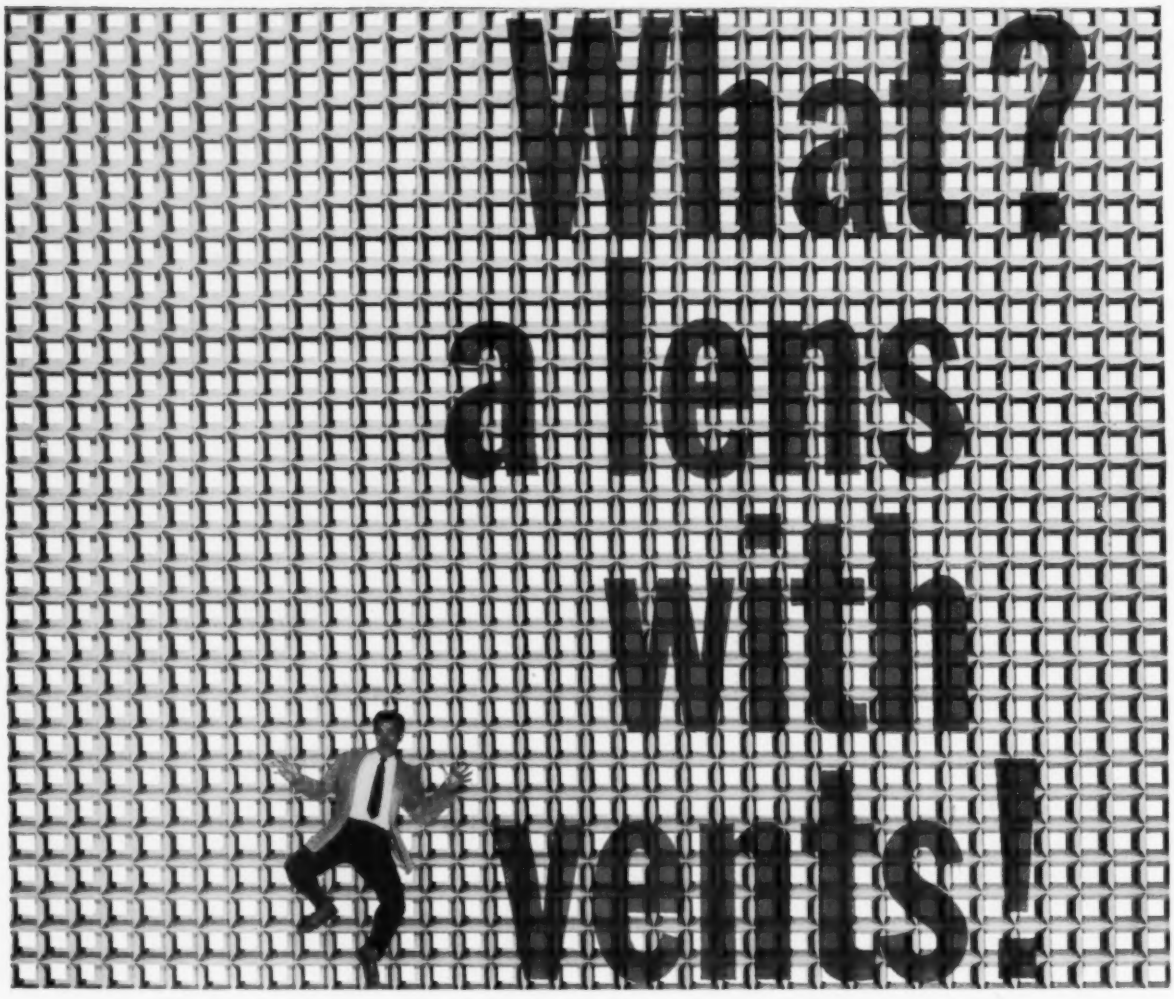
IDEAS for modern residential wiring and lighting from current home building projects.

page 69

New vandal alarm system protects a group of schools by audio surveillance.

page 98

A McGRAW-HILL PUBLICATION | 57TH YEAR



ballast men are amazed about Guth Prismoid-GrateLite*

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57TH YEAR MARCH • 1958

Sidelights 5

Washington Report 7

Centralized Control, *An Editorial* 67

Residential Wiring Ideas 69

A roundup of practical wiring layout and design practice from current construction plans of modern electric homes.

Light for Modernizing Kitchen 80

Built-in luminaires provide light for modernized kitchen. One of the awards in the International Lighting Competition.

Distribution in a Multi-Building Plant 82

By W. W. HENDERSON—A modern high-capacity electrical system for a multi-building plant uses a load center layout fed by high-voltage interlocked armor cable in an underground tunnel.

Illuminated Fountain 88

New York's International Airport display has 308 underwater floodlights and three separate jet mediums regulated through motorized sequencing and electronic control.

Estimating Forum-IX 91

By RAY ASHLEY—Operating costs—ratio of labor job costs to material job costs.

High-Voltage Lighting Features Low-Voltage Control 92

The new 15-floor Blanton Building in Richmond, Va., is completely wired for 24-volt remote switching of its 277-volt lighting system.

Common Code Problems 96

By B. A. McDONALD—Why service heads are installed above the drop.

MORE

Electrical Construction and Maintenance

MARCH • 1958 *continued*

Vandal Alarm System 98

By J. F. McPARTLAND—A unique sound surveillance system is now on duty to inform city police headquarters of intrusions or disturbances at any of the city's seven schools during the night and other times when the schools are left unattended.

Practical Methods 105

Electronic control press guard; steel job shanty proves good investment; bending table adjusts for conduit size; safety interlocks guard plant bridge.

Motor Shops 127

Coil winding chart speeds motor rewinds; notch in spray booth roof admits hoist chain.

Reader Service 135

Product news announcements; catalogs and bulletins.

Reader's Quiz 173

Questions and answers on plant equipment grounding; wound-rotor motor current; ground wires; breaker ratings.

Questions on the Code 180

Answers to code questions on grouping motors on one branch circuit; grounding outdoor lighting standards; instrument panel; autotransformers.

In the News 197

Dates Ahead 218

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Sidelights

RESIDENTIAL WIRING PRACTICE

A special report on residential wiring and lighting practice leads off our feature section this month. Practical ideas from current jobs are described and illustrated in "Residential Wiring Ideas" beginning on page 69. Among the more significant developments noted in reviewing the projects is the trend toward 150-amp and larger services, influenced by the popularity of central air conditioning, and the extensive use of built-in lighting fixtures.

VANDAL ALARM SYSTEM

In our October 1957 issue, we devoted an editorial to an alarm system designed to protect city schools from the rising tide of juvenile vandalism. The editorial aroused wide interest among our readers, but at the time, we had few further details available. The installation referred to in the editorial has now been completed and is in operation. Engineering Editor J. F. McPartland, Jr., who has kept in touch with the project since its inception, describes the installation in a feature article beginning on page 98. In his story only those details which are of pertinent interest to the electrical construction industry are given. And because the system is intended to facilitate apprehension of intruders and has not been publicized in the community, we have withheld the name of the city.

LOW VOLTAGE CONTROL

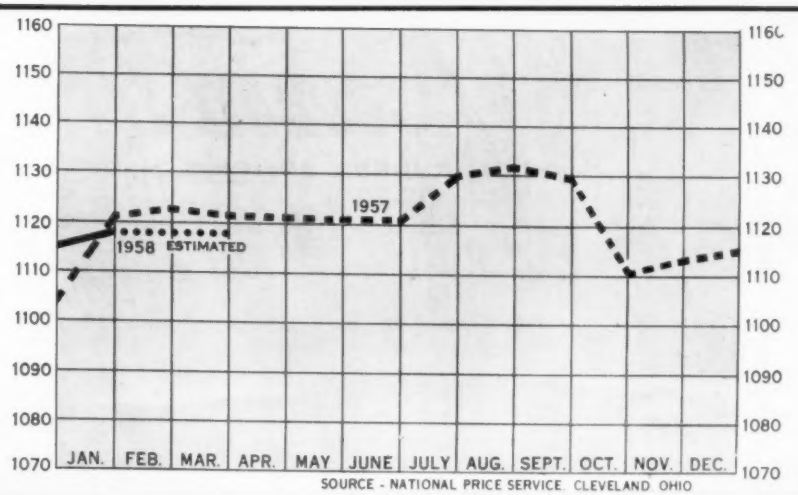
The first of several new State office buildings in the Capital Square area of Richmond, Va., is equipped with 277-volt fluorescent lighting controlled by 24-volt, Class 2, relay switching. Low voltage switch control was employed because of the large number of metal partitioned small offices and the prospect of frequent partition changes. The installation is described in "High-Voltage Lighting Features Low-Voltage Control", beginning on page 92.

FOUNTAIN SPECTACULAR

Electronic control of hundreds of water columns and lighting combinations is featured in New York International Airport's spectacular illuminated fountains. In a cluster of nine pools, four contain motor operated fountains and color lighting installation which produce a variety of effects in a continually changing program sequence. The electrical installation details of the largest of the pools, 200 ft in diameter, are described in "Illuminated Fountain", beginning on page 88.

ELECTRICAL MATERIALS COST INDEX

BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT THE VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.



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Washington Report

● **Anti-recession actions get all the headlines** and keep government economists busy, but possibilities of renewed inflation worry some top officials in the Administration, in the Federal Reserve Board, and in Congress. This inflation worry stems from three main areas: 1) renewed wage-cost-price spiral as result of "excessive" wage increases in coming labor union negotiations; 2) trend to ever-increasing Federal budgets; and 3) government's reluctance to fight inflation with the same zeal as it fights recession. These worries are reflected by cautious attitudes of many officials in considering the many proposals made to bolster the economy during this current recession.

● **Unemployment, and declines in industrial production** highlight the business downturn, which is generally defined and accepted as a "recession" and not as a depression.

Unemployment in January was up to 4.5 million, and the rolls increased still more in February. This was about double the year-earlier figure. Also, employment in January was down to 62.2 million, compared with 62.6 million a year earlier.

Industrial production in January stood at 133 (FRB Index), down nine points from a year earlier, and down 14 points from the record level of 147 reached in December 1956. The January level represented a decline for each of the past five months, from a rate of 145 which existed last August. Broad curtailments in durable goods industries in January accounted for most of the decline.

● **Residential housing made a good start in January** when its total starts, public and private, rose to 69,000. This compared with 62,000 in December, and with 63,000 in January a year earlier, and resulted in a seasonally-adjusted annual rate of 1,030,000. Final BLS report on housing starts for last year gives total as 1,039,200 units

New building construction in January also got off to a good start, a total of $3.3 billion, which is a record for any January. Leaders in the increase were public utilities, office buildings, churches, and hospitals, while declines were reported in industrial and store building construction.

● **Copper prices declined still further last month** as the U. S. demand continued slow. Price dropped to 23½¢ per lb, a new low since 1950.

● **Some economic highlights:** Current family disposable income is $5,300, and should rise by $2,000 by 1975, Committee for Economic Development predicts . . . Personal income (from all sources) hit a record $343 billion in 1957, up 5% over 1956 . . . Civilian labor force increased slightly last year, averaged 67.9 million as compared with 67.5 million in 1956 . . . Production workers last year earned $82.46 weekly, a gain of $2.47 over 1956 . . . Retail sales rose to almost $200 billion in 1957, up $10 billion over 1956 sales. . . Consumer credit climbed $2.7 billion during 1957, to a record total of $44.8 billion owed at end of December. Installment credit was $34.1 billion, while non-installment credit was at $10.7 billion . . . Business failures rose to 13,739 during 1957, compared with a total of 12,686 in 1956. Marked increases over prior years were in retail trades and construction.

● **A business pickup by midyear is predicted** by Administration officials, and confidently hoped for. Should the recession continue, however, the only solution proposed so far is to "spend" the nation back to prosperity. Big increases in public works spending—a backlog of needed public works of some $200 billion has been mentioned —will undoubtedly get wide Congressional backing.

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How Research Shapes Our Future Prosperity

If you are looking for an industry that is going to keep on booming in 1958 and every year for the next decade, here it is. It is the industry of technological innovation through research and development.

Last year this great new industry spent over $7 billion to discover and develop new industrial products, processes and equipment. This year the preliminary McGraw-Hill survey indicates that total expenditures for industrial research and development will be even greater, perhaps as much as $8 billion. Of the companies surveyed, 57% plan to spend as much as in 1957 and 38% plan to spend more.

The sustained expansion in research and development is the best guarantee we have that the current decline in business investment in new plants and equipment will be relatively short-lived. There can be no prolonged decline in investment in an economy where technology is changing rapidly.

This editorial is designed to show how the continued surge in research and development can be expected to lead first to new products, and eventually to renewed expansion of investment in new industrial plants and equipment. Such expansion is the essence of national economic growth.

A Slow Start

The impact of research on sales and investment is still very gradual. Research spending itself has more than doubled in the last four years. But only 32% of all manufacturing firms report significant capital outlays to make new products. We are not reaping the full dividends of industrial research as yet for several reasons:

- Research expenditures were relatively small until the Korean War of 1950 brought substantial government contracts in aviation, electronic and related fields. Heavy research outlays for civilian and industrial products came even later.

- There is an average *lag*, according to research directors consulted by the McGraw-Hill Department of Economics, of roughly seven years from the start of research until the product is ready for large scale output — about five years of research and at least two years to solve production problems and develop markets.

- Complex products, such as new consumer durables and industrial machinery, have an even longer time lag.

However, new developments are certainly underway. Research began to increase in all lines of business when Korean War restrictions and

the excess profits tax came to an end in 1953. The tax revision of 1954 added a new incentive by making research outlays deductible as a current business expense. By 1955, the research boom was on.

When Is The Payoff?

With a lag of about seven years, it will be the early 1960s before these new developments become a dominant factor in capital investment. But once the flow of new products and new processes starts, it will accelerate sharply — just as research spending has accelerated in the past few years.

By 1960, over $50 billion in sales will be coming from products not on the market as recently as 1956. Sales of new products will increase year by year, but they will gain most in 1960-1962, or five years after the recent spurt in research expenditures.

Capital expenditures to manufacture new products will also rise, but with a slightly longer lag. Here the sharpest rise should come in 1962-1965, as the new products reach a volume that calls for a significant amount of new capacity. In most cases, initial output of new products will come from existing capacity.

This timing of a new wave in capital investment appears logical on other grounds. Population experts forecast an upsurge in marriages and births around 1965. So by 1962, industry will be starting to tool up for new mass markets.

The important point is this: As we approach the 1960s more and more sales and investment will be in new products growing out of research. By 1960 well over 10% of manufacturing sales will be in new products not on the market in 1956.

Meanwhile — research will help stabilize capital spending by raising the level of modernization and replacement expenditures. Of course, research does not eliminate all the ups and downs in the demand for capital goods, for there remain variations in the amount spent to expand capacity. But a high level of modernization, to cut costs and improve quality, does put a floor under any drop in investment.

What To Expect

During the next few years we can expect an increasing flow of new materials, new metallic alloys, new machinery — primarily those developments coming out of long-established research programs in the chemical and electrical industries. Industry will make wider use of specialized computers and automated equipment.

But the dramatic payoff on research comes even later. In the early 1960s the consumer goods industries will begin tooling up for their really new products — things so basically new they can change the way a family lives. Such items as plastic houses, paper apparel, turbine autos are under development right now. But it will take several years to get costs down and for population and incomes to grow to the point where mass markets are created.

When we reach that point in the mid-1960s, there will begin the greatest surge of capital investment in all history. And then — around 1965 — the new processes (full automation, atomic power, continuous steel casting) which are the slowest and most expensive part of the research chain to develop, will come into play.

The combined impact of new products and new processes, to meet an expanding market, will thus be felt in the mid-1960s — eight to ten years after the recent sharp increase in research spending. The full impact is that far away because of the lags for applied research, pilot plant studies and market introduction. But to a large degree the prosperity of the 1960s has already been shaped by the research programs now underway.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

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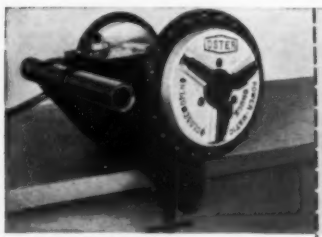
2. NEW "POWER-MATIC" FRONT CHUCK gives automatic, non-slip grip for both right- and left-hand operations. New, neoprene-bonded jaw inserts eliminate jaw sharpening . . . can be replaced quickly and easily at low cost.

3. SELF-CENTERING REAR CHUCK insures perfect pipe alignment for sharp, clean threads . . . provides support for longer lengths of pipe.

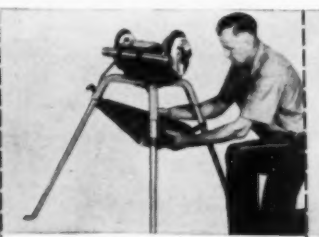
4. POWERFUL NEW MOTOR—reversible, variable-speed type—has machine-cut, hardened-steel gears mounted on ball bearings for extra long, trouble-free life.

5. OPTIONAL ACCESSORIES, shown below, enable you to use this versatile machine anywhere . . . thread any pipe up to 12" diameter.





Special "C" clamp mounting makes it easy to clamp this machine to workbench, truck or other suitable mounting.



Tool tray fits snugly on lightweight tubular stand . . . puts tools within safe, easy reach.



Sturdy tripod stand folds quickly into a compact, easy-to-carry unit.



Special drive unit gives extra pipe threading range, increases capacity to 12" pipe.

Weight.... Only $185.00

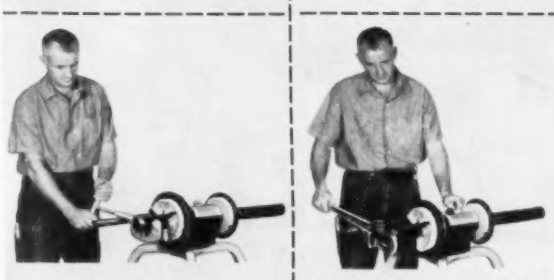
ALL-NEW DESIGN...WEIGHS ONLY 77 LBS...PUTS HEAVY-DUTY POWER INTO EVERY HAND PIPE-THREADING TOOL



Whatever the tool – die stock, reamer, cutter or pipe wrench – it's far faster, far easier when power replaces muscle to turn the pipe instead of the tool. Use the "100" Power Drive for...



THREADING | REAMING



CUTTING OFF | TURNING FITTINGS ON OR OFF

See Your Oster Distributor

THE OSTER MANUFACTURING COMPANY
1313 East 289th Street, Wickliffe, Ohio

Please rush me full details on the *new* Model "100" Power Drive and optional accessories.

Name_____

Company Name_____

Address_____

City_____ Zone_____ State_____

Cut costs... without cutting corners! Specify... GEDNEY CONDUIT BODIES

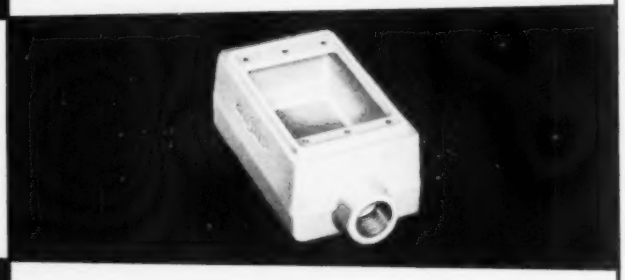
Gedney Conduit Bodies mean lowest installed cost! That's because they are skillfully made of tough, *malleable* iron, then hot-dip galvanized, and finally, they must pass the toughest inspection. Accurate machining and threading assure easiest installation . . . ruggedness assures longest service life!

THE GEDNEY CONDUIT BODY LINE INCLUDES ALL TYPES—SIZES ½" TO 4"



TYPE LB—Threaded—for heavy-wall rigid conduit. Use them with Gedney entrance fittings, straps, clamp backs to get an *entire* conduit system that is hot-dip galvanized.

TYPE FS—Threaded—shallow bodies for heavy-wall rigid conduit. Hot-dip galvanized finish prevents corrosive deposits—means easier installation, longer life.





SCORES OF OTHER GEDNEY FITTINGS are available for every purpose—all carefully designed, manufactured and inspected to assure economical installation and maximum customer satisfaction.

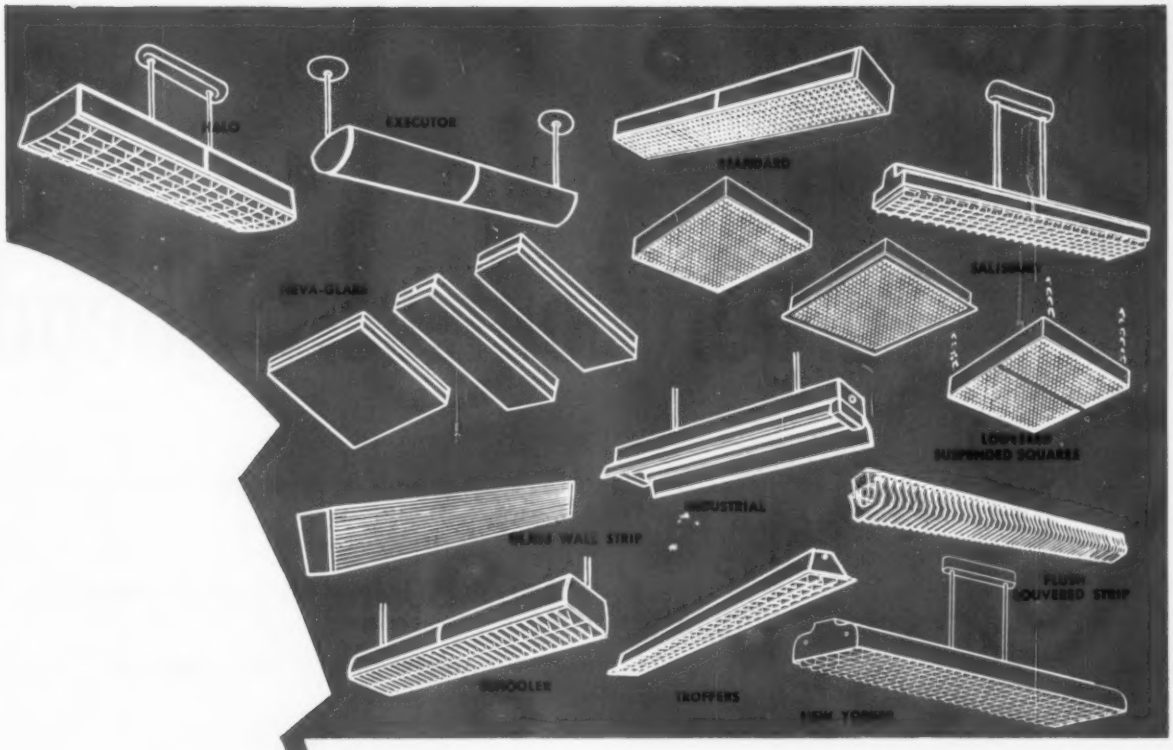


GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

GEDNEY FITTINGS FIT



EYES *RIGHT*..

When MARLOU FIXTURES Supply the Light!

Above all else, correct lighting is the essence of easy-on-the-eyes illumination. And, above all else, Marlou Fixtures provide modern eyes-*right* lighting because they're opthalmically correct in design and construction.

Marlou manufactures fluorescent lighting fixtures for countless standard and special applications in stores, schools and other institutions, commercial buildings, laboratories and industry.

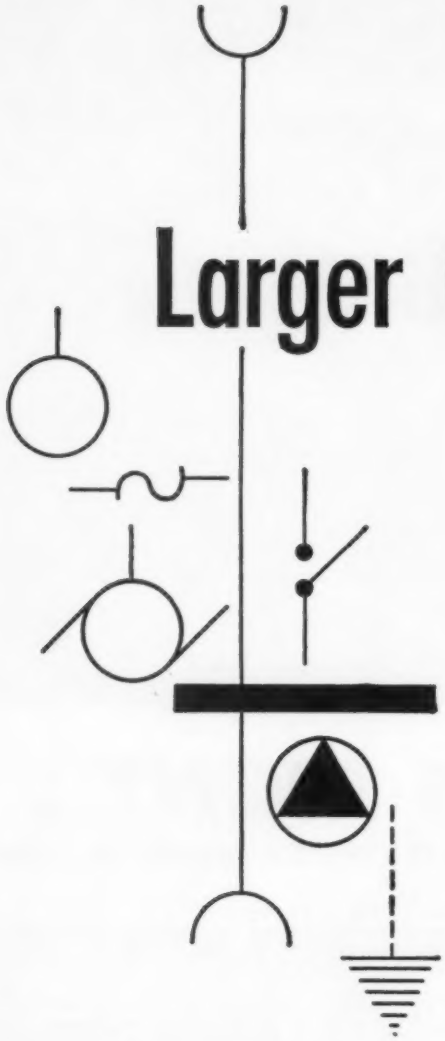
- Fluorescent and Slimline for direct and reflective lighting
- Single unit and continuous installations
- Stem, recessed and flush-mountings
- Easy installation and convenient maintenance
- Union-made and Underwriter's Laboratories approved



See Us At The NATIONAL LIGHTING EXPOSITION Booth #B5

marlou
LIGHTS, INC.
FANWOOD, NEW JERSEY

Complete information and illustrated catalog will be promptly sent upon request. Ask for yours TODAY!



Larger Contracts Ahead

New business and profits promised by new Honeywell line of electrical systems products.

NOW HONEYWELL has entered the growing field of electrical systems for control, signalling, communication and alarm with a new line of products—separate from Honeywell's regular temperature control business. These new products will help you to more business, more profits because they'll be backed by this kind of support from Honeywell:

Research and engineering that will develop new products. Honeywell's vast research and engineering organization—one that has already produced more than 12,000 new products—will be working in your field, developing new products that you furnish and install. This means an expanded area of operation for you—a larger share of the construction business.

Advertising and promotion that will develop new markets. You're not expected to sell these products. Honeywell does it for you through a sales organization based in 112 offices throughout the country and through advertising directed to the people you do business with—architects, builders, engineers, educators and businessmen. Honeywell sells your prospects. *You* get the profits.

New Type of Supervised Service—You can install Honeywell's new products confidently and profitably. Honeywell's new supervised service works with you and helps you from the signing of the contract to the final acceptance of the job. Honeywell specialists in your city will help you plan and install the system. They will then check it out, adjust it and help correct any faults. Finally they will provide complete service during your guarantee period.

As a service to your customer, Minneapolis-Honeywell offers a low cost system maintenance contract providing for parts, periodic service, inspection and emergency service for the life of the building.

for Electrical Contractors!

First products in Honeywell's new line of electrical systems.

Honeywell Hotel/Motel Master*
Puts up to 24 Separate Functions Under One-Man Control.

Hotel and motel operators have already shown a great interest in this system which brings them labor savings and extra conveniences plus better service for guests. Already installed in some of the country's smartest new hotels and motels, this system uses incoming information signals and outgoing command signals to provide efficient front desk supervision over maid service, guest room status, lighting, air conditioning and many other features. In each installation this system has proved that electrical signals are cheaper and faster than footsteps.

Honeywell has prepared a table of owning costs for each feature so that the hotel or motel operator can compare costs with savings, decide which features he wants most. Of course, Honeywell helps with the installation, offers a maintenance agreement contract to the owner.

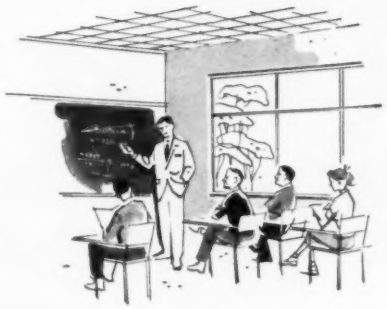


Honeywell Light Saver* Gives Precise Light Control, Helps Cut Electric Bills!

With this Honeywell system, modern daylighting really pays off for the user. Tests prove savings on electricity for lighting run as high as 80%.

Each building is zoned so that the artificial lighting for each room in any zone is equal. The phototubes sense the daylight coming into each zone, actuate precise Honeywell controls and switches to turn up artificial lights as they are needed, turn them off when they are no longer necessary. When complete darkness is desired the entire system is turned off by a manual switch in the room. It returns automatically to phototube control when the switch is turned on again.

Its applications are numerous especially in the industrial and school field. The Honeywell Light Saver can be used to control either fluorescent or incandescent lighting. A Honeywell specialist helps you install it. And it's backed by years of testing and research plus the Honeywell low-cost maintenance agreement and service facilities.



*Trademark

Watch for another new Honeywell product for you—coming next month.

Honeywell

First in Controls

FREE—Honeywell Literature with this coupon!
MINNEAPOLIS-HONEYWELL
Dept. EC-3-55
Minneapolis 8, Minnesota
Please send me more information on:

- ☐ Honeywell Light Saver
- ☐ Honeywell Hotel/Motel Master
- ☐ Honeywell Maintenance Agreements

*Name*_____

*Address*_____

*City*_____ *State*_____

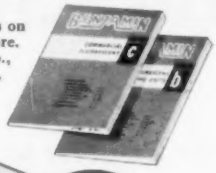
BENJAMIN

...always the source of good lighting... anywhere in the plant!

Now Setting the Pace in COMMERCIAL LIGHTING too!

If you could look at factory lighting with the roof off like this you'd get an idea of the many different lighting units it takes to provide the right light for every seeing task. When you specify BENJAMIN you are assured of a specially-engineered unit for every factory and office location—designed for better seeing with maximum eye comfort.

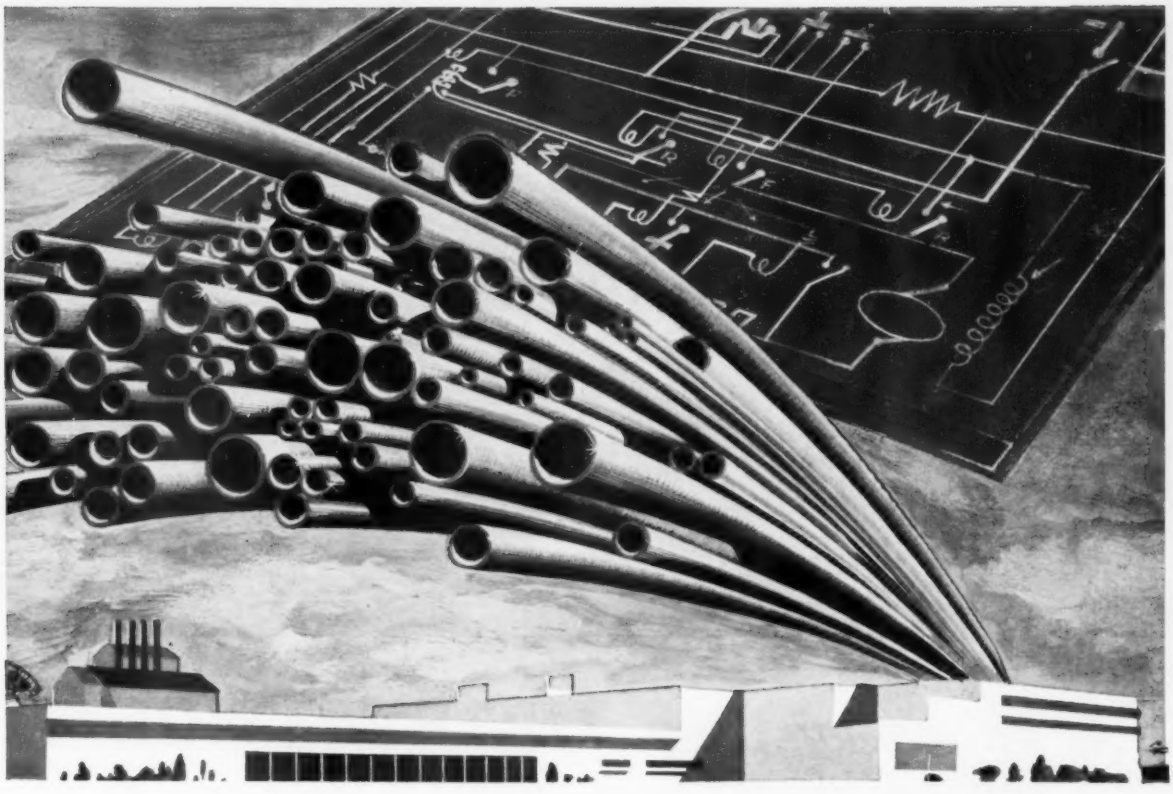
Send for illustrated data bulletins on any or all of the units shown here. Benjamin Electric Mfg. Co., Dept. H, Des Plaines, Illinois



1. Explosion-Proof Units
2. Vapor-Tight Incandescent
3. Triple-Flo Continuous Lines
4. Stream-Flo Continuous Systems
5. Stream-Flo w/27° Shielding
6. RLM Dome Reflectors
7. Stream-Flo w/Plastic Covers
8. Elliptical Angle Reflectors
9. Steelite Armor-Clad Units
10. Twin-Flo Individual Units
11. Symmetrical Angle Units
12. Semi-Direct Industrial w/25% Uplight
13. Twin-Flo w/10% Uplight
14. Panel-Glo Safari Systems
15. Stock-Bin-Lite
16. Officer Louvered Units
17. Panel-Glo Corrugated Systems
18. Glass-Enclosed Troffers
19. RD Projectors
20. Duo-Service Floodlights

R-133RRC

Naugatuck KRALASTIC



Kralastic conduit cut labor cost 82%

In a West Coast plant construction job, 15,060 feet of Kralastic® thermoplastic pipe were laid as electrical conduit and covered with 53 yards of concrete in only 116 man-hours... 82% less than if metal conduit had been used! Additionally, 24% was saved in cost of materials!

One man required but 20 minutes to make permanent, water-tight connections to 24 conduits installed in an excavation. This was possible only because Kralastic pipe can be cut with a hacksaw and solvent-welded, using sleeve-type joints, completely eliminating time-consuming threading operations and wrench work.

The light weight of Kralastic pipe (one-eighth that of steel) enabled a man to carry on his shoulder as much as 1,000 feet of 1½-inch pipe at one time, greatly facilitating its distribution and handling. Other advantages of Kralastic conduit are that it cannot rust or corrode, is not subject to electrolysis, and has a hard, smooth inner surface that makes wire pulling easy.

Kralastic pipe, up to 6 inches in diameter, is made and sold by leading plastic pipe concerns throughout the country. If not available in your community, write us for the name of the manufacturer nearest you. Remember, there are other types of plastic pipe... but Kralastic conduit pipe is in a class by itself!

United States Rubber

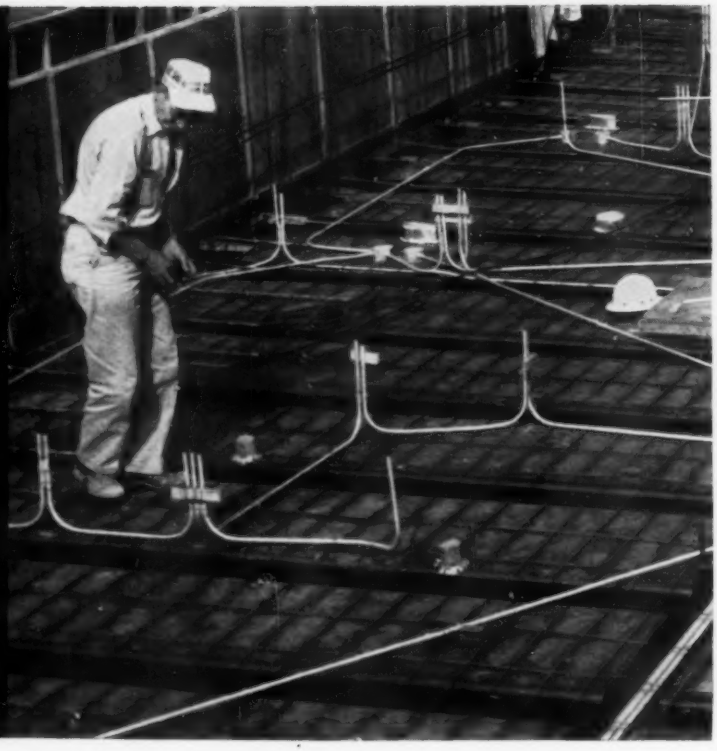
Naugatuck Chemical Division 346K Elm Street Naugatuck, Connecticut

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Republic ELECTRUNITE E.M.T.

...quality controlled from ore to job-site...



is the reason why **THE BEST COSTS**

BEST . . . *because* bending quality is built in! Republic ELECTRUNITE® E.M.T. is produced from highest quality flat-rolled open-hearth steel made in Republic's own mills and carefully inspected to Republic's rigid requirements.

BEST . . . *because* the accurate ELECTRUNITE process insures tubing on which fittings fit every time, and "time means money" to every contractor.

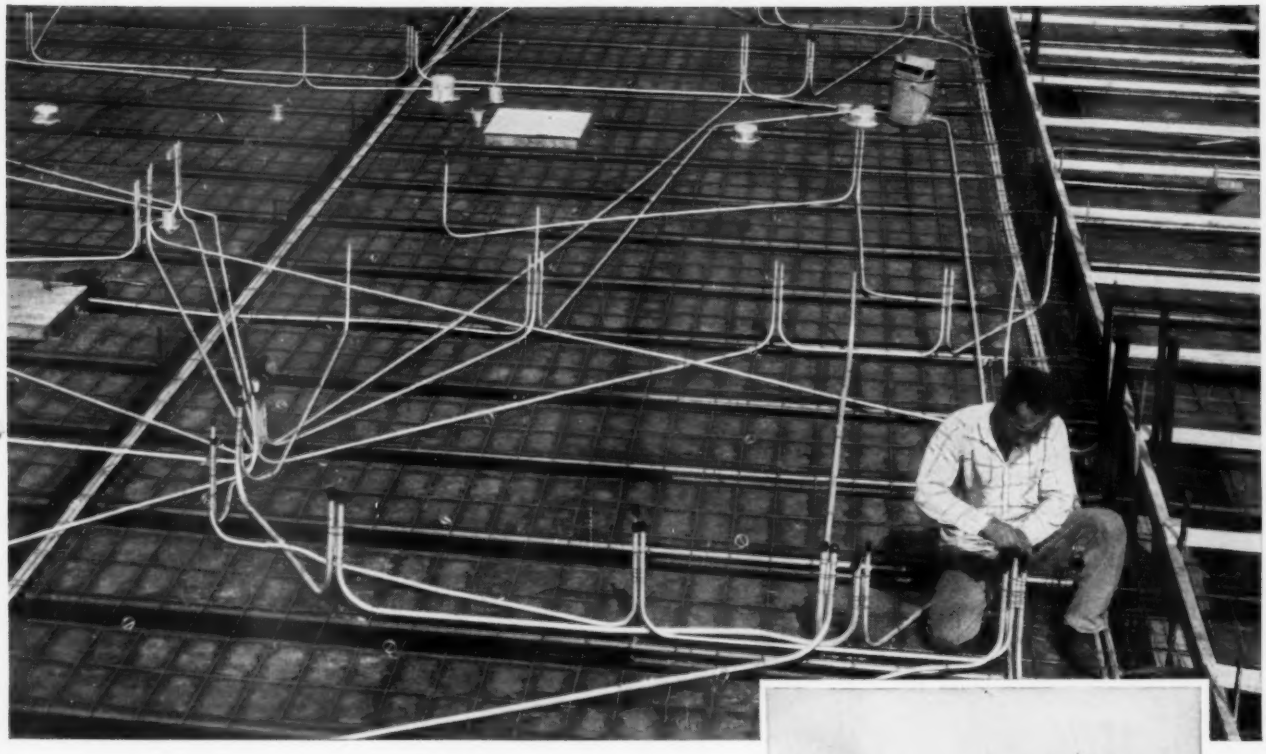
BEST . . . *because* Republic's "INCH-MARKED" and "GUIDE-LINED" ELECTRUNITE E.M.T. offers greater



Best because it's "INCH-MARKED"... in feet and inches in popular sizes for fast, accurate measuring every time.

Best because it's "GUIDE-LINED"... keeps bends in the same plane. Avoids wasted time and materials.

Best because of "INSIDE KNURLING"! Makes wire pulling up to 30% easier.



LESS INSTALLED

installation economies. "INCH-MARKED"® . . . easy to measure! "GUIDE-LINED" . . . keeps bends in line. "INSIDE KNURLING" . . . for easy wire pulling.

BEST . . . *because* Republic ELECTRUNITE E.M.T. meets building code requirements . . . is produced to A.S.A. Specification C.80.3 and Federal Specification WW-T-806, (latest revisions) and carries the Underwriters' Laboratories Seal of Inspection.

Send coupon today for additional information, or call your Republic ELECTRUNITE distributor.



Republic ELECTRUNITE E.M.T. was used throughout the construction of the Medical Building, San Diego, California, as shown in the architect's sketch above. The photo at the top shows the job ready for concrete pour. Owner: San Diego Investment Corporation; Architect-Engineer: Richard George Wheeler and Associates; General Contractor: Trepte Construction Co.; Electrical Contractor: Capitol Engineering Co.

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World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
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Please send additional Republic ELECTRUNITE E.M.T. "INCH-MARKED", "GUIDE-LINED" information.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____



Builder Dale J. Bellamah (right) discusses the location of a telephone outlet with J. P. McBurney of Mountain States Telephone and Telegraph Company.

"Concealed telephone wiring helps me merchandise my homes"

—says Mr. Dale J. Bellamah, Builder, of Albuquerque, New Mexico

"Right now I'm building a community of some 2000 homes," says Mr. Bellamah. "And in every home we're putting concealed telephone wiring.

"It's a real sales aid. It helps me merchandise my homes. We list it in our advertisements, and we point to it as an example of what we mean by our slogan, 'First in size—first in new ideas.'

"If you're in the business of building modern homes for people with modern ideas, you can't expose the telephone wiring any more than you can expose the plumbing!"

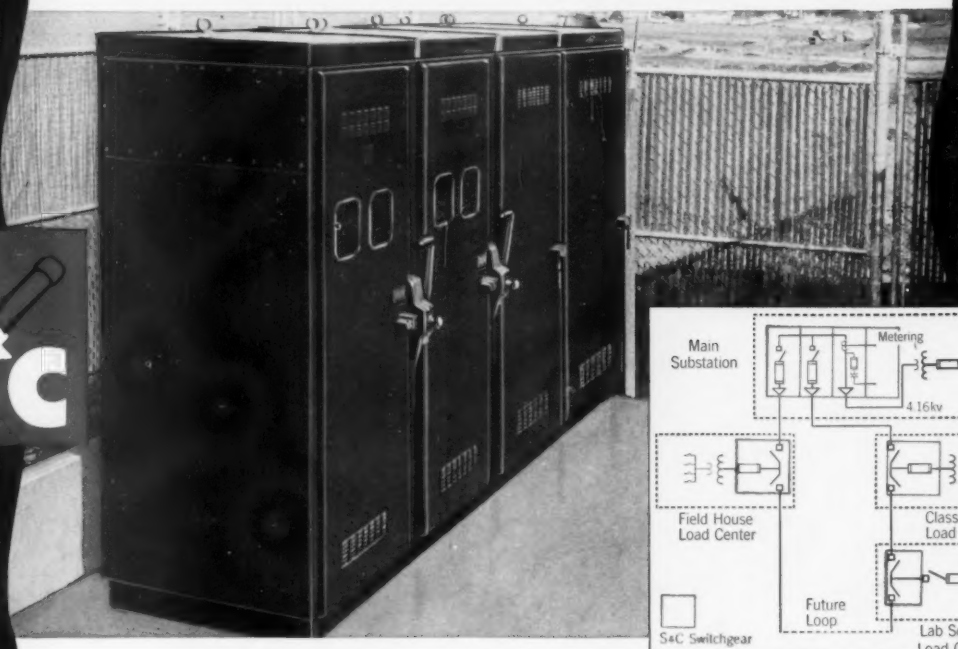
Mr. Bellamah is the biggest builder in New Mexico. During the past ten years he has built upwards of 5000 homes. He has been on the Executive Committee of NAHB among many other positions he has held in that Association, and in 1956 he was National Chairman of the Military Housing Committee. Mr. Bellamah is one of many trend-minded builders throughout the country who are convinced that concealed telephone wiring is a modern feature that helps them sell their homes in today's highly competitive market.

* * *

Your local Bell Telephone Business Office will be glad to help you with concealed wiring plans. For details on home telephone wiring, see Sweet's Light Construction File, 8i/Be. For commercial installations, Sweet's Architectural File, 32a/Be.

BELL TELEPHONE SYSTEM

For your high-voltage power circuits–



S&C Metalclad Switchgear at Northern Illinois University's main substation, DeKalb, Illinois. Resident Architect: Kenneth Thelen; Consulting Engineer: S. W. Knetsch & Associates, DeKalb; Electrical Contractor: Virgil Cook & Sons. The unit shown is the main substation secondary gear. Three other S&C units (see one-line diagram) serve as the primary switchgear for the three load centers.

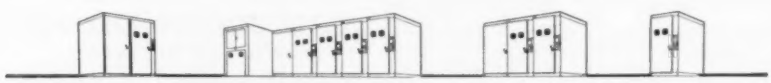
Buy the right protection in your switchgear . . . buy S&C metalclad switchgear . . . save 50%

Institutional and industrial high-voltage power circuits, such as that shown here, do not have transient faults. They cannot be re-energized immediately following an outage. Thus the use of costly circuit breakers is unnecessary. The right protective devices for such circuits are S&C Power Fuses.

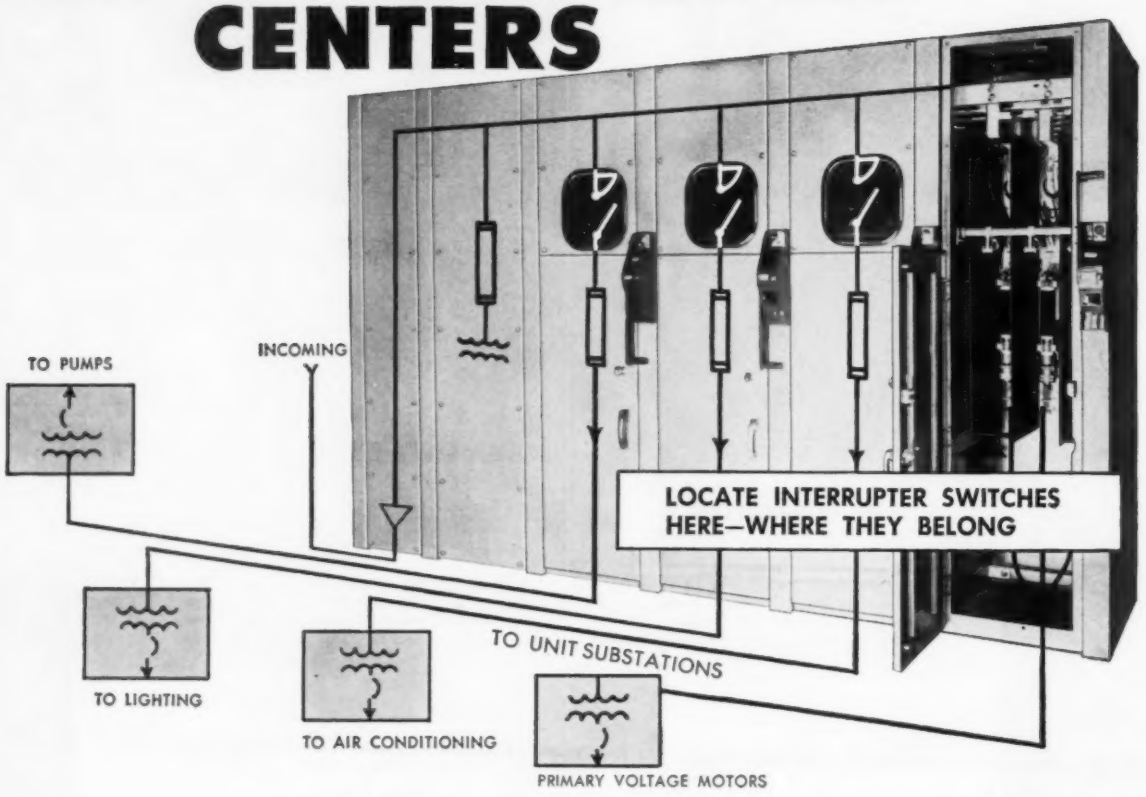
For such high-voltage power circuits, conductors run in cables or conduits. They are not exposed to lightning, falling trees, rodents, wind, or ice which cause transient faults on overhead circuits typical of electric utilities.

Consequently, the only faults that occur are permanent faults, and S&C Power Fuses give the right protection against them. The quick reclosing feature of expensive circuit breakers is of no value here. S&C Metalclad Switchgear—by using S&C Power Fuses rather than circuit breakers and by incorporating load interrupters for full load switching—brings a substantial savings in switchgear costs, sometimes as much as 50%.

S&C Electric Company, 4433 Ravenswood Ave., Chicago 40, Ill.
In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



R&IE POWER SWITCHING CENTERS



✔ Cost Less ✔ Save Space ✔ Easier to Maintain

✔ Safe —with the HPL-C interrupter switch—because it will close in on moderate faults.

SAFE CLOSING RATINGS

Asymmetrical 3-phase Kva values:

Nom. Voltage	Direct or Chain Drive	TOG-L SNAP, non-current limit fuses	TOG-L SNAP, current limit fuses
2,400	50,000	150,000	250,000
4,800	75,000	250,000	500,000
7,200	75,000	250,000	750,000
12,000	75,000	250,000	1,000,000
13,800	75,000	250,000	1,000,000

Always specify TOG-L SNAP operating mechanism for maximum safety. Available as optional feature.

PSC HIGH VOLTAGE CUBICLES, standard design, indoor or outdoor, offer both efficiency and economy.

SAVE FIRST COST—Standardized, low-cost PSC cubicles with HPL-C fused interrupters, feature sectional main bus—providing compact flexibility. PSC means lower cost per feeder than scattered locations of switches in unit substations.

SAVE SPACE—With dry type load center transformers, PSC can save many square feet of floor space at the unit substation location. They also may be mounted overhead, saving additional floor space.

EASIER TO MAINTAIN—Easily operated, accessible for inspection. Can be handled with any maintenance crew.

PROTECT SYSTEM—Against faults in cables as well as transformers.

ADD FEEDERS any time—up to 1200 Amp. total load.

Ask your I-T-E Representative to show you the many PSC economies. Data available.

R&IE

R&IE EQUIPMENT DIVISION
I-T-E CIRCUIT BREAKER CO.
GREENSBURG, PA.

PSC - 3

COLUMBIA



easy E.M.T.

bending . . . easy "fishing"

The smooth, clean inside enamel finish of Columbia E. M. T. makes wire-pulling easy. The galvanized coating prevents corrosion. Every length is thoroughly inspected before shipment—always uniform. Plus, Columbia gives you service that keeps your installations "on-schedule."

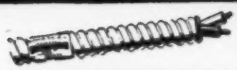
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Columbia CABLE & ELECTRIC CORP.
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NON-METALLIC SHEATHED CABLE


FLEXIBLE STEEL CONDUIT


E. M. T.


A.B.C. ARMORED CABLE

Sales Representatives in the following Cities: Atlanta, Ga.; Boston, Mass.; Charlotte, N. C.; Chicago, Ill.; Cleveland, Ohio; Cincinnati, Ohio; Dallas, Texas; Detroit, Mich.; Glassport, Pa.; Houston, Texas; Kansas City, Mo.; Los Angeles, Calif.; Minneapolis, Minn.; New Orleans, La.; New York, N. Y.; Philadelphia, Pa.; Portland, Ore.; St. Louis, Mo.; San Francisco, Calif.; Seattle, Wash.; Tulsa, Okla.; Utica, N Y.

Allis-Chalmers announces... **Newly**

1

Gang-operated disconnect switch isolates starter from incoming power — assures safe entry of high voltage compartments.

2

Steel cubicle is compartmentalized — separates high and low voltage equipment.

3

Short-circuit protection is provided by fast-acting current-limiting fuses, rated 150,000 kva at 2300 volts and 250,000 kva at 4160 or 4600 volts.

4

Overload protection is handled by accurate relays which trip only on excessive motor current, preventing needless motor stoppages.

5

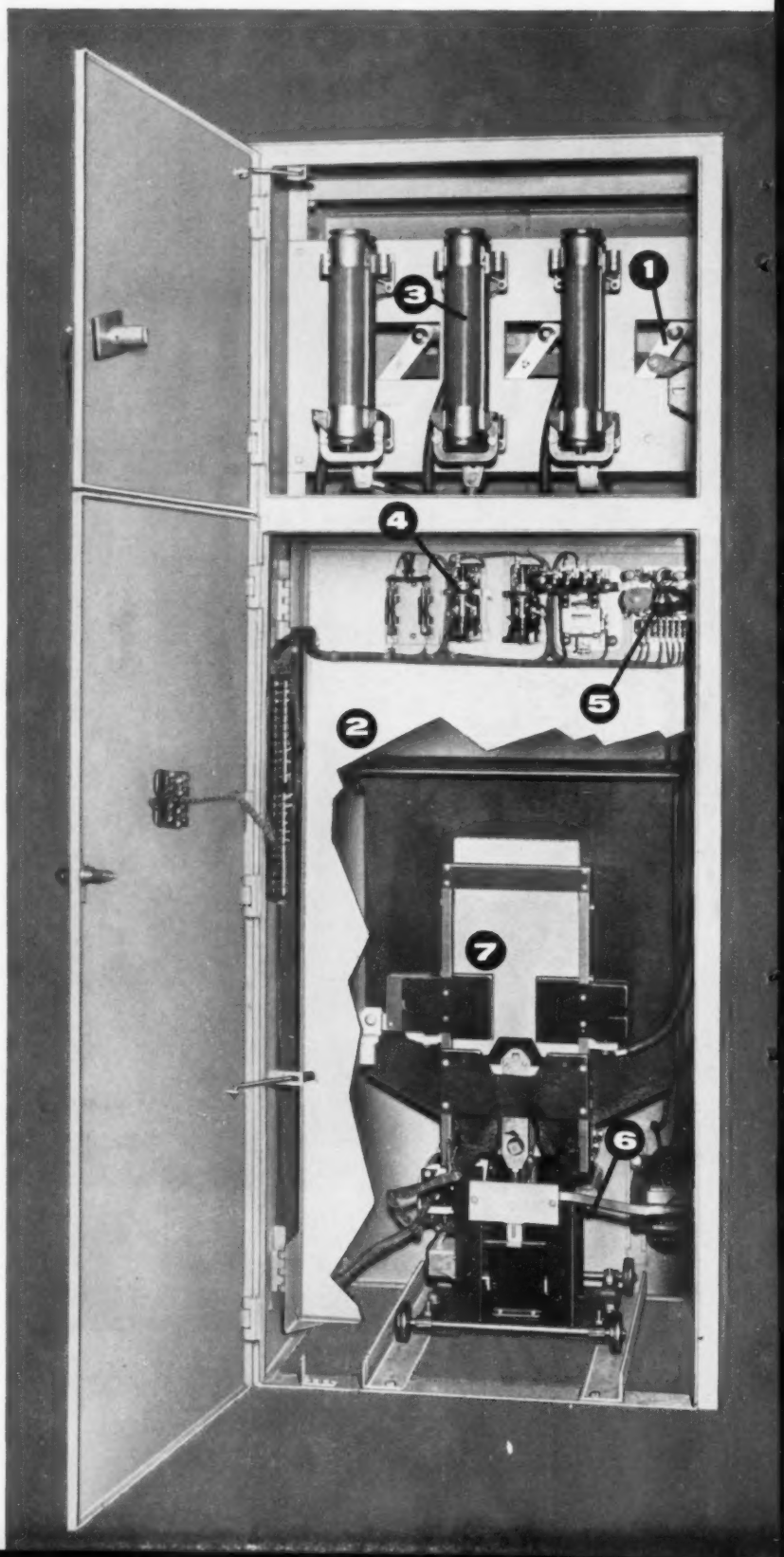
Undervoltage protection instantaneously opens line contactor on loss of voltage. Time-delay undervoltage protection also available.

6

Mechanical interlock coordinates contactor, disconnect switch, upper door and inner control barrier for maximum safety.

7

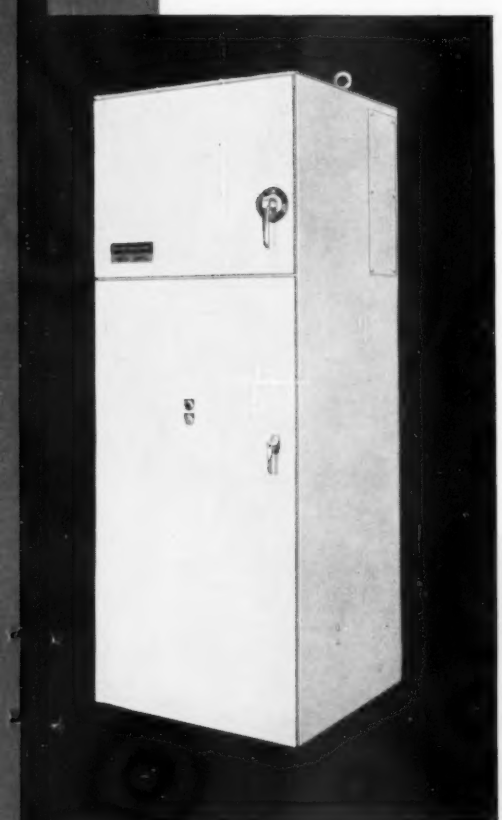
Roll-out contactor makes maintenance easy—even in narrowest aisle space. (Routine inspection and maintenance can be done with contactor in place.)



Designed

Type H High Voltage Motor Control

Combines front access with space economy...



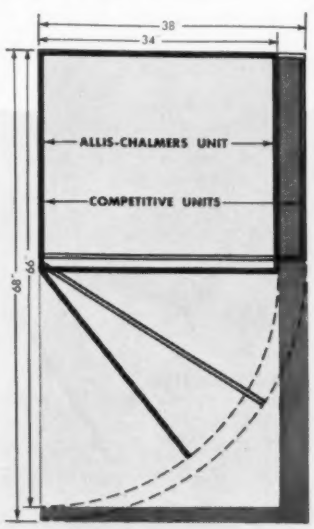
In addition, you get maximum protection for personnel and machines, thoroughly tested components, and ample panel space for modifications. It's all built into the *smaller cabinet* of a newly designed line of Type H high voltage starters from Allis-Chalmers.

Here is control that couples compactness with roominess (for ease of maintenance) . . . here is a starter that joins test-proven performance with versatility (for addition of meters and relays) — AND the line meets every 2300 to 5000-volt motor need.

For more information on this engineering advance, contact your A-C representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS UNIT requires 2.3 sq ft less floor space than any competitive unit. Put 10 A-C units in the same area needed for 9 cabinets of other manufacture.

Indicates 2.3-sq-ft saving in floor space



ALLIS-CHALMERS

A-5517

SPECIFY QUALITY . .

INSIST ON McGILL® PORTABLE LAMP GUARDS



McGill Industrial Lampguards give you an extra margin of quality—in materials and workmanship—that assure a safe dependable light; where you want it, when you need it. Parts and materials are all carefully selected for resistance to wear and abuse in rugged industrial service. 660 watt, 250 volt sockets. Choose the right lamp guards for your needs from the more than 100 different type offered by McGill.

Underwriters Laboratories Inspected



No. 7100 SR Lamp Guard

Clamp arrangement allows quick lamp changing without tools. Gray Neoprene-butyl handle, reflector, LEVOLIER® switch and extra heavy steel cage.

No. 5025 SRG Service Light

Completely grounded service light. 15 amp., 125 volt convenience outlet built into molded phenolic handle. Safe on-the-spot source for power tools, etc. 25 feet 16-3-SJ black rubber cord.



No. 5000 SR Lamp Guard

With 15 amp., 125 volt convenience outlet in impact and heat- and grease-reisting, positively insulating molded phenolic handle. No-Rol cage and reflector.



No. 3006
Vaporproof Lamp Guard

Watertight, vaporproof and moisture proof for complete safety. Heat and impact resisting glass globe screws into a silicone rubber gasket. Handle molded of macerated phenolic.



No. 652 Lamp Guard

Rubber hook handle, thumb release clamp for easy bulb replacement can be hung, for maximum light, from hook or handle.



No. 5000 SLRG Lamp Guard

Completely grounded. 15 amp,. 125 volt 3-wire convenience outlet for 2 parallel blades and a U shaped blade for ground. Molded phenolic handle. Resists oil, grease, breakage, moisture and abrasion. End lens concentrates light.

FREE

Send for free copy of McGill Catalog No. 84 . . . . today!

McGILL®
ELECTRICAL SPECIALTIES

are always a little better and ***ALL*** *are Underwriters Laboratories Inspected*

McGILL MANUFACTURING COMPANY, INC. **450 N. Campbell St., Valparaiso, Indiana**

HERE'S *double* PROTECTION



NOW galvanized Sherarduct is coated with NEW

FORMULA MVC-1

the modified polyvinyl chloride resin that provides the most effective barrier against corrosive agents of all kinds

National Electric has developed a new way to combat conduit corrosion. It is called Formula MVC-1, a new modified polyvinyl chloride resin coating that's available only from National Electric.

Here's what MVC-1 does to even further increase the protection against corrosion offered by the Sherardizing process of galvanizing.

RESISTANCE TO CORROSIVE ATTACKS—In accelerated salt spray, sulphuric acid and caustic tests conducted by the Pittsburgh Testing Laboratories, new Sherarduct with Formula MVC-1 far outlasted all hot dipped and other high-grade coated and galvanized conduits tested.

RESISTANCE TO FLAKING—Formula MVC-1 makes a tight, uniform, adhesive coating that withstands bending without cracking or flaking.

TEMPERATURE RESISTANCE—Formula MVC-1 is extremely resistant to high and low ambient temperatures and will withstand the majority of all industrial temperature conditions.

NOW ADD THIS NEW CORROSION RESISTANCE TO SHERARDUCT'S OTHER FEATURES

1. The Sherardizing process of galvanizing that alloys zinc with the conduit walls.
2. Normalized, highly ductile steel for easy bending and threading.
3. Zinc protected threads for complete end-to-end protection.

These are the features that convince architects, engineers and contractors it is best to specify National Electric Sherarduct when real corrosion protection is required. Write for complete information on new Sherarduct today.

Listed by Underwriters' Laboratories, Inc.

Sherarduct with MVC-1 is Galvanized Conduit at Its Best

NATIONAL ELECTRIC PRODUCTS — WIRING SYSTEMS — WIRES AND CABLES

National Electric Products

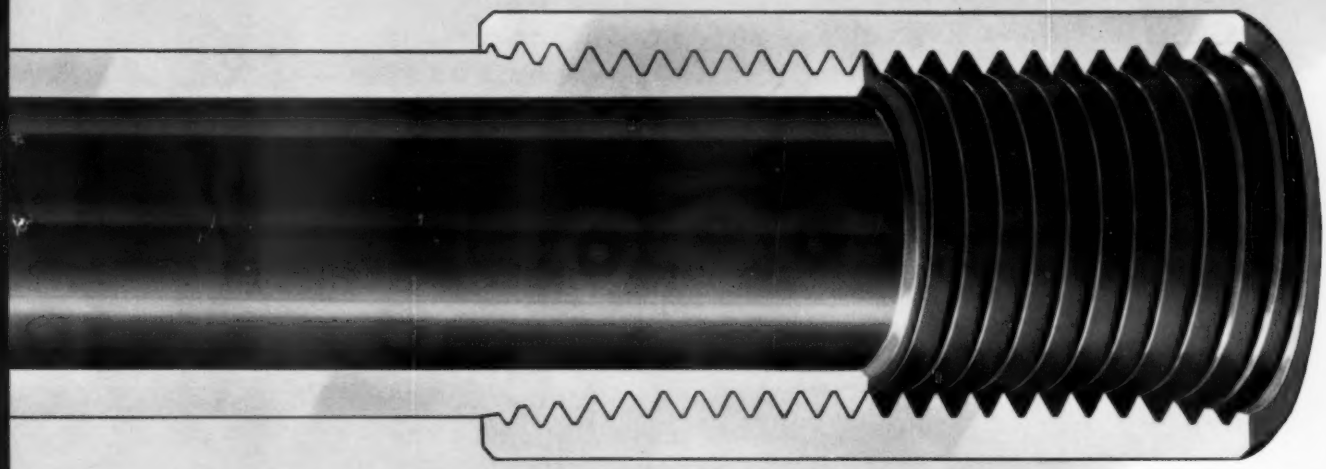
PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

INTERIOR PROTECTION—Formula MVC-1 makes new Sherarduct the first conduit with really lasting protection against interior corrosion. MVC-1 is a smooth, uniform coating that not only protects the conduit, but makes fishing easier by reducing friction between wires and conduit walls.



HERE'S *double* PROTECTION



NOW galvanized Sherarduct is coated with NEW

FORMULA MVC-1

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Listed by Underwriters' Laboratories, Inc.

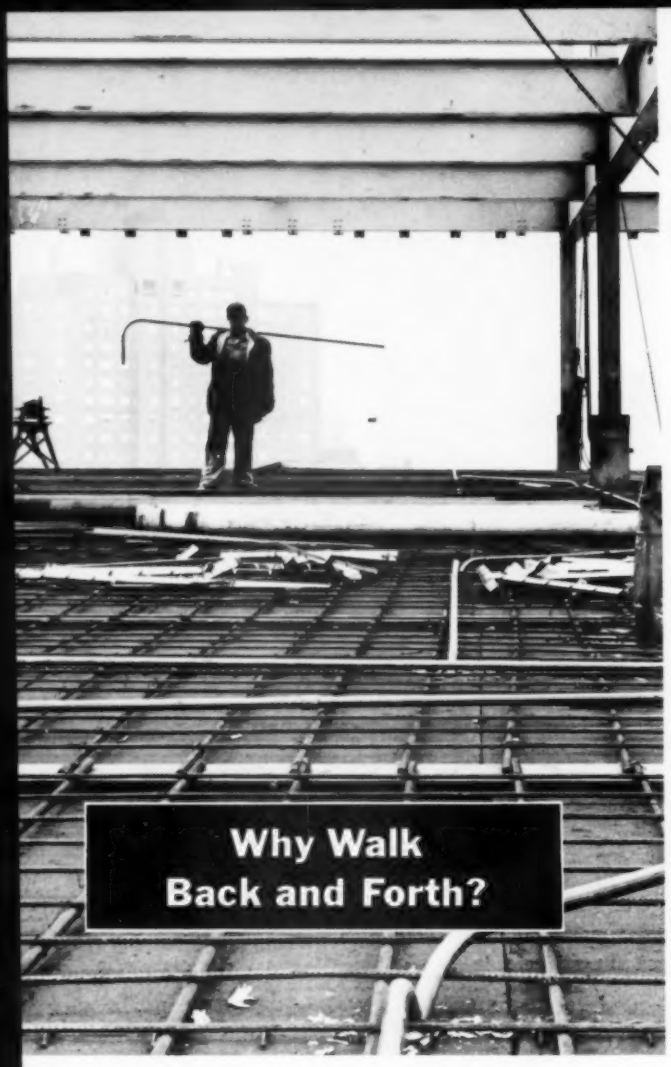
Sherarduct *with MVC-1* **is Galvanized Conduit at Its Best**

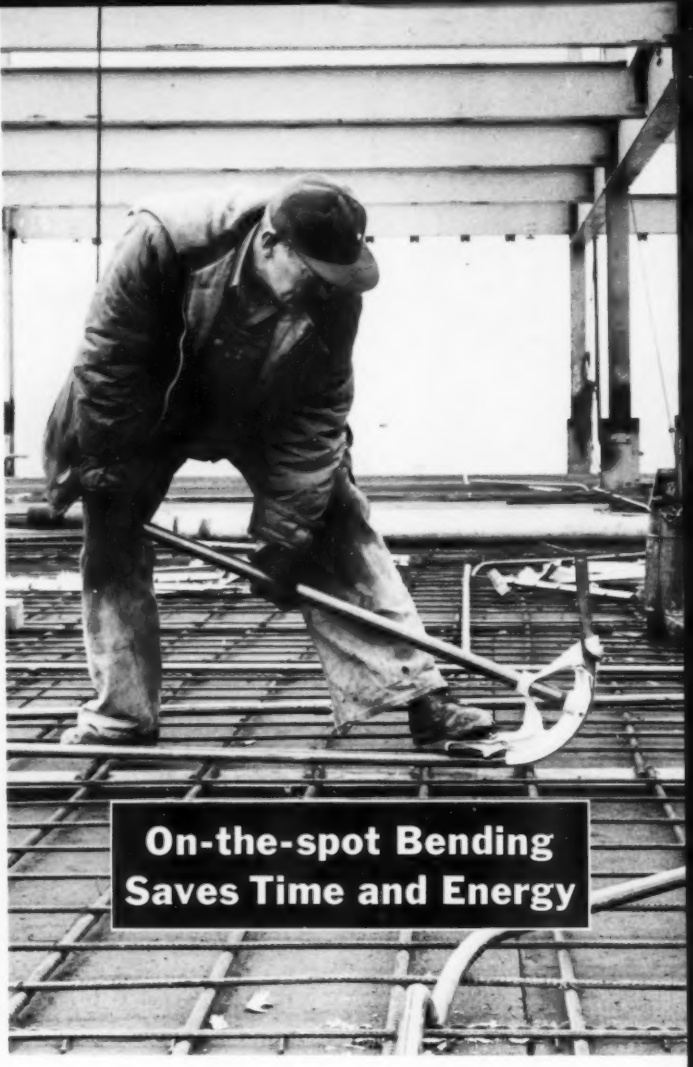
NATIONAL ELECTRIC PRODUCTS — WIRING SYSTEMS — WIRES AND CABLES

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices





National Electric "Redege" Benfield Benders Take the "Trudge-ry" Out of Conduit Bending

No time-consuming, tiring trudging back and forth from the job to a bench or power tool. No waiting in line to use the power tool. Modern, lightweight, portable "Redege" Benfield Benders give the good journeyman a precision tool for accurately fabricating conduits at the point of installation . . . "on the spot."

Check these features. They make "Redege" Benfield Benders a favorite with experienced electricians:

1. One tool for both rigid and EMT.
2. Non-skid solid hook.
3. Outriggers on hook to stabilize tool and give operator solid footing.
4. Built-in back-pusher for removing a few degrees of bend when necessary.
5. Produced from unbreakable pearlitic iron for safety.
6. Bold, clear symbols on both sides of tool for precision bending.
7. Extended foot treadles or Powr-Jack booster steps for maximum foot leverage.
8. Pre-stressed at factory—guaranteed 5 years.

Take the trudge-ry out of conduit bending—get National Electric "Redege" Benders now!

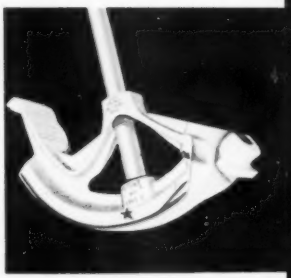
Stocked by leading electrical distributors everywhere!

National Electric Products

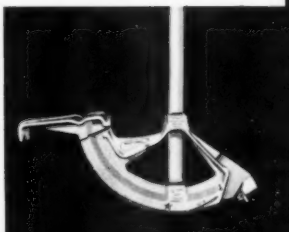
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2 Plants • 12 Warehouses • 41 Sales Offices

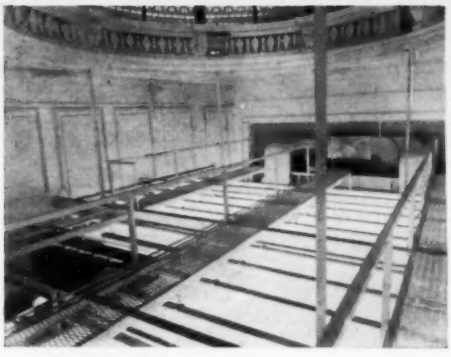
STANDARD MODELS	
Catalog No.	Description
1050	Bends ½" EMT
1075	Bends ¾" EMT and ½" Rigid
1100	Bends 1" EMT and ¾" Rigid



"POWR-JACK" MODELS	
Catalog No.	Description
PJ-75	Bends ¾" EMT and ½" Rigid
PJ-100	Bends 1" EMT and ¾" Rigid
PJ-125	Bends 1¼" EMT and 1" Rigid







Remodelling? Give the Lighting a Fresh Look with a Luminous Ceiling by LITECONTROL!

Here's another "team job" where architect, electrical engineer, electrical contractor (and the customer) obtained excellent results with standard Litecontrol equipment, at sensible cost!

The architect had to come up with a solution to the deep, high ceilinged area and he did. He modernized this old-fashioned interior adroitly — made a handsome, well illuminated banking area by running I-beams across the dome, and suspending Litecontrol's integral Luminous Ceiling from the beams. (note small photo.) Lamps may be easily serviced from the catwalks.

The diffusing medium (upper photo) is plastic grid louvers. Beauty of this material is that it is easy to work with (it was cut "tailor-made" around the curve of the soffit) . . . it is lightweight . . . translucent . . . and has the functional low brightness look with high light transmission onto the work surfaces. The shielding angles are noteworthy — 45° x 45°.

RESULT: A lighting job of overall distinction.

Whether you are starting "from scratch" or are remodelling, have a "problem" installation (or not), there is a way to do it better with LITECONTROL.

INSTALLATION: Portsmouth Trust Co., Portsmouth, N. H.
AREA SHOWN: Main Banking area
ARCHITECT: W. H. Jones & Son, Melrose, Mass.
ELECTRICAL ENGINEER: Martin E. Keane Associates, Boston, Mass.
ELECTRICAL CONTRACTOR: Walter Reddin, Portsmouth, N. H.
DISTRIBUTOR: Mass. Gas & Electric Supply Company, Portsmouth, N. H.
FIXTURE: Litecontrol Luminous Ceiling, using molded plastic grid louvers. Slimline single-lamp strip fixtures on 24" centers.
INTENSITIES: Top of tellers' counters, average 72 foot-candles in service.
Work area on tellers' counters, average 63 foot-candles in service. Overall average throughout room, 52 foot-candles in service.

LC

LITECONTROL

Fixtures

KEEP UPKEEP DOWN

LITECONTROL CORPORATION,

36 Pleasant Street, Watertown 72, Massachusetts

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

the Switch is to PYLE-NATIONAL

industrial lighting fixtures

EXPLOSION-PROOF
LE Series (Class I, Groups C and D)
60 to 500 Watts
Choice of body and reflector styles

EXPLOSION-PROOF Floodlights
FEA Series 150 to 300 Watts



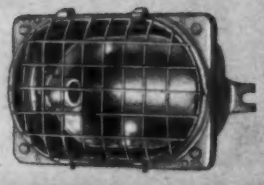
DUST-TIGHT
DE Series (Class II, Groups E, F and G and Class III)
60 to 200 Watts
Choice of body and reflector styles



VAPOR-TIGHT
DO Series 10 watt signal or pilot lights
BO Series 50 to 500 watts
Choice of body and reflector styles



FLUSH VAPOR-TIGHT
Type 1570 Pit and subway lights
100 and 200 watts



Literature Furnished On Request

SINCE 1897

Sold Nationally Through Authorized Distributors

THE PYLE-NATIONAL COMPANY

WHERE QUALITY IS TRADITIONAL

1344 N. Kostner Avenue, Chicago 51, Illinois

Branch Offices and Agents in Principal Cities of the U.S. and Canada • Canadian Agent: The Holden Co., Ltd., Montreal
Railroad Export Department: International Railway Supply Co., 30 Church St., New York 7, N.Y.
Industrial Export Department: Rocke International Corp., 13 E. 40th St., New York 16, N.Y.

CONDUIT FITTINGS • PLUGS AND RECEPTACLES • TURBO-GENERATORS • MULTI-VENT AIR DISTRIBUTION

Tape it easy, Mac!

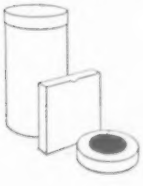


Gold Seal Tape sticks tight in any weather

You can do a first-class insulating job — easier and faster — with Gold Seal Friction Tape. It tears evenly, conforms readily to uneven surfaces, sticks *tight* in any temperature and under all weather conditions. And one thickness *insulates.* For lasting "tack", for all-around insulation protection, ask for Gold Seal Friction Tape. Made by Jenkins Bros., Rubber Division, 100 Park Avenue, New York 17.



In 10-roll containers or single rolls • Each roll sealed in cellophane, stays fresh

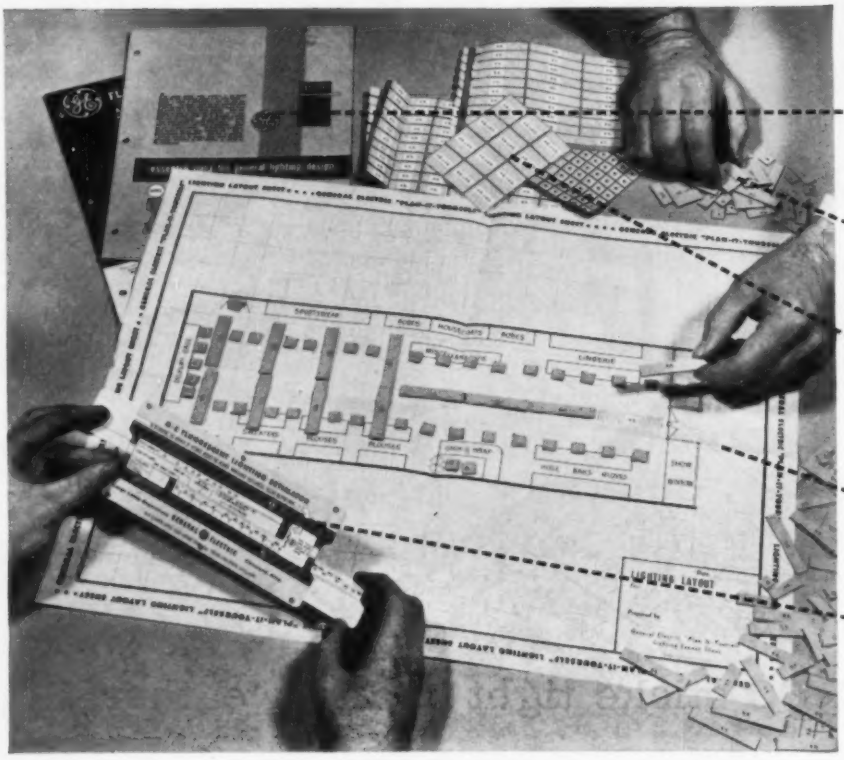


Gold Seal Tape

Gold Seal FRICTION • *Rubber • Plastic Tapes...Commercial and Specifications Grades*

"Won contracts on 85% of the lighting jobs I bid on...with the G-E Lighting Layout Kit!"

C. F., ELECTRICAL CONTRACTOR, JERSEY CITY, N. J.



HERE'S POSITIVE PROOF that the General Electric "Plan-it-yourself" Lighting Layout Kit is a *real* selling tool. This New Jersey electrical contractor actually sold 22 out of 25 jobs he bid on, and he gives a lot of credit for each one of them to his G-E Lighting Layout Kit. No isolated case, here's what others are discovering about the kit:

- **J. E., Fixture Manufacturer from Chicago, Ill.**—"The best selling tool in the world! Used it successfully on 200 lighting jobs!"
- **A. L., Electric Service Co. Representative from Pittsfield, Mass.**—"We use parts of the kit on every job we lay out—75 of 'em to date!"
- **H. B. S., Manufacturer's Representative from Dallas, Texas**—"We've used the General Electric Lighting Layout Kit on 28 jobs. It's quick, easy and complete!"
- **J. P., Wholesale Agent Salesman from San Jose, Calif.**—"Used it on 30 jobs . . . the kit is a big help in showing customers what they're getting, in a simple manner!"

(names furnished on request)



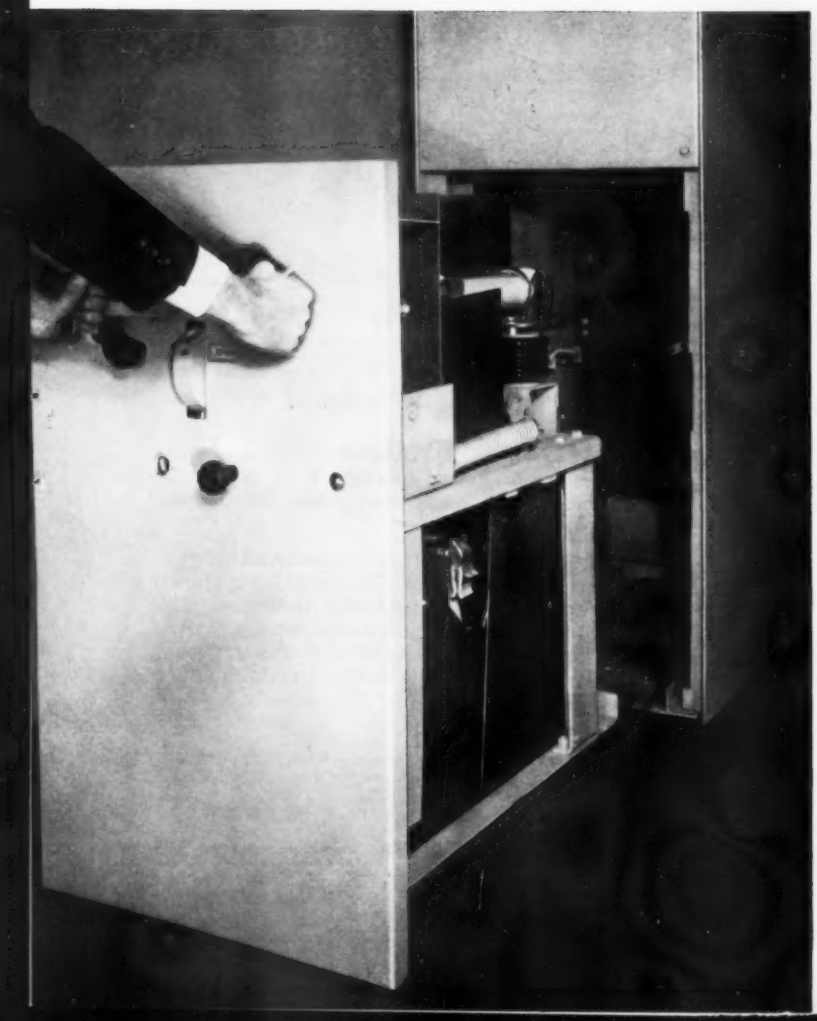
ORDER YOUR KIT TODAY! Only $1.75! Makes selling easier because prospects can visualize what you're telling them. They'll take part in the planning—and help sell themselves up to a better lighting job. See your local G-E Lamp Representative or write: General Electric Co., Large Lamp Dept. ECM-38, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Simple maintenance, inspection with General Electric ROLLOUT Switch and Fuse Equipment



It's new—General Electric Rollout Switch and Fuse Equipment. It rolls out like a file cabinet drawer—allows simple, fast inspection and maintenance. Plus—improved protection, greater safety, and installation flexibility.

For more information on this new Rollout Switch and Fuse Equipment call your nearest General Electric Apparatus Sales Office or write for bulletin GEA-6623, General Electric Company, Schenectady, New York.

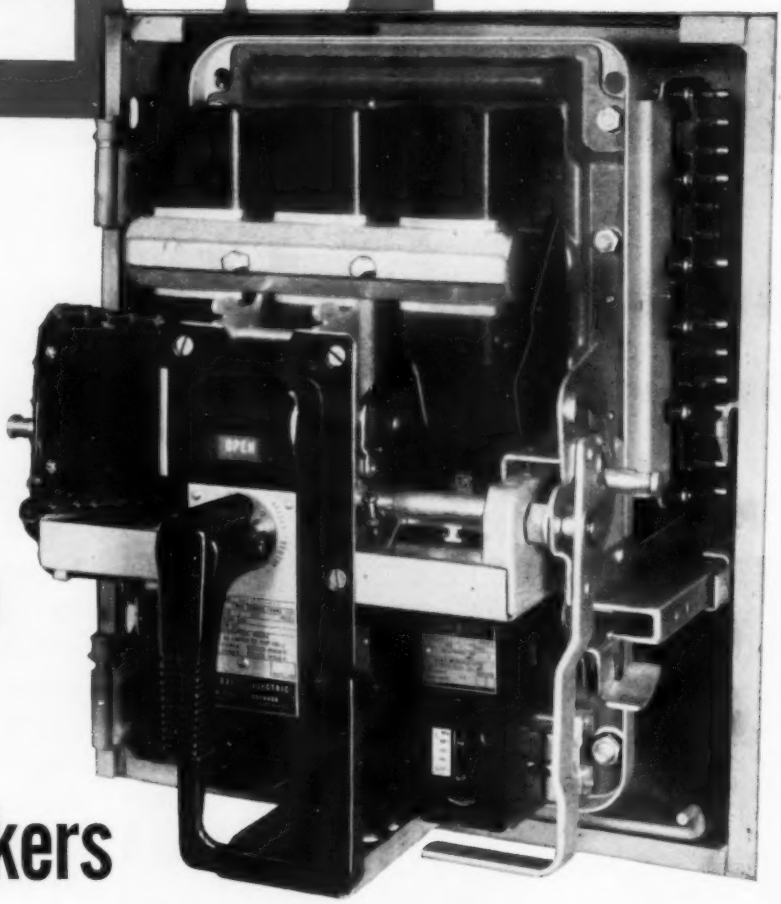
514-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW ROLLOUT SWITCH AND FUSE EQUIPMENT, in ratings from 2.4 kv to 13.8 kv, is applicable for both normal switching and fault current protection.

NEW



AK-2 Low Voltage Power Circuit Breakers

225, 600 Amperes Continuous current, 600 volt AC, 250 volt DC with . . .

- **STORED ENERGY MANUAL CLOSING**
  Spring operated mechanism provides constant contact closing speed independent of operator. Assures lower maintenance, prolongs breaker life, and widens application. Electrically operated versions are solenoid driven.
- **ACCESSIBLE OVERLOAD TRIP DEVICES**
  Easily interchangeable trip units, removable from the front, provide greater accessibility for field adjustments.
- **UNIT OPERATING MECHANISM**
  Simplifies maintenance, interchanging of trip devices, and facilitates field conversion from manual to electrical operation.
- **COMPLETE BREAKER INTERCHANGEABILITY**
  For greater flexibility, new AK-2 low voltage power circuit breakers are completely interchangeable with AK-1 breakers of comparable ratings.

For more information on this new breaker design, contact your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

527-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

"How G-E carbon brushes helped . . .

STOP METAL TRANSFER"

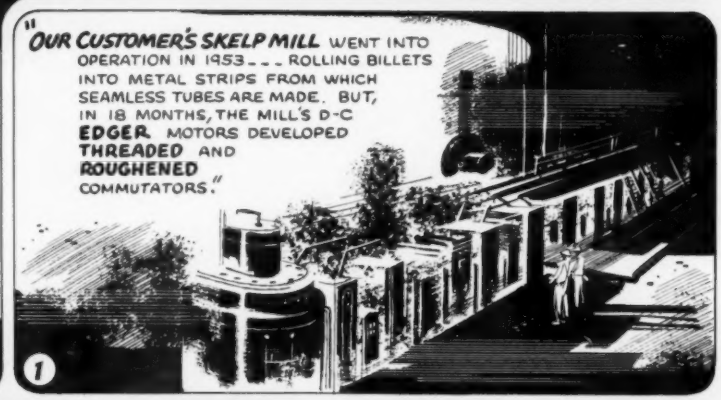
A GENERAL ELECTRIC CARBON BRUSH CASE HISTORY



AS TOLD BY

L. H. Schweitzer

CARBON PRODUCTS APPLICATION ENGINEER GENERAL ELECTRIC COMPANY



1 "OUR CUSTOMER'S SKELP MILL WENT INTO OPERATION IN 1953 . . . ROLLING BILLETS INTO METAL STRIPS FROM WHICH SEAMLESS TUBES ARE MADE. BUT, IN 18 MONTHS, THE MILL'S D-C EDGER MOTORS DEVELOPED THREADED AND ROUGHENED COMMUTATORS."



2 "SINCE THE EDGERS MAINTAIN STRIP WIDTH DURING ROLLING, CONTINUOUS PERFORMANCE WAS IMPERATIVE. WHEN THE MILL OPENED, A HIGH LEVEL OF MAINTENANCE WAS INITIATED BY THE CUSTOMER, AND OUR OWN ENGINEERS WERE CLOSELY FOLLOWING OPERATION OF OUR NEW ELECTRICAL EQUIPMENT."



3 "AS SOON AS TROUBLE WAS SPOTTED, AN ANALYSIS WAS MADE OF ALL VARIABLES AFFECTING THESE UNITS. FINDINGS? THE BRUSHES WERE SUBJECTED TO A HIGHER PERCENTAGE OF LIGHT LOADS THAN WAS ANTICIPATED. THIS SET UP CONDITIONS CONDUCIVE TO EXCESSIVE METAL TRANSFER AND POOR FORMATION OF A STABLE FILM ON THE COMMUTATOR."



4 "ABSENCE OF A PROTECTIVE FILM HASTENED THREADING AND ROUGHENING. SO A SPECIALLY DESIGNED GENERAL ELECTRIC BRUSH WAS RECOMMENDED, WHICH ENCOURAGED FORMATION OF A STABLE FILM UNDER THESE LOADS, THUS PREVENTING EXCESSIVE TRANSFER."



5 "FAST FOLLOW-UP AND A COMPLETE LINE OF BRUSHES FOR EVERY NEED SOLVED OUR CUSTOMER'S PROBLEM WITH NO LOSS OF PRODUCTION! CHECKS OVER THE NEXT TWO YEARS SHOWED THREADING AND ROUGHENING ELIMINATED."

SPECIFY GENERAL ELECTRIC CARBON BRUSHES FROM THIS COMPLETE LINE TO HELP GET TOP PERFORMANCE FROM YOUR G-E MOTORS AND GENERATORS. FOR HELP WITH YOUR BRUSH PROBLEMS USE COUPON OR CONTACT YOUR G-E APPARATUS SALES OFFICE OR DISTRIBUTOR. GENERAL ELECTRIC CO., SCHENECTADY 5, N.Y.



New bulletin offers answers to brush application and performance problems by one of industry's top authorities.

GENERAL ELECTRIC CO.
Section F774-5 • Schenectady 5, N.Y.

☐ Please send GEA-6688, "Better Carbon Brush Performance"

☐ Also, send GEA-5597, "G-E Carbon Brushes for Motors and Generators"

NAME.....

TITLE.....

COMPANY.....

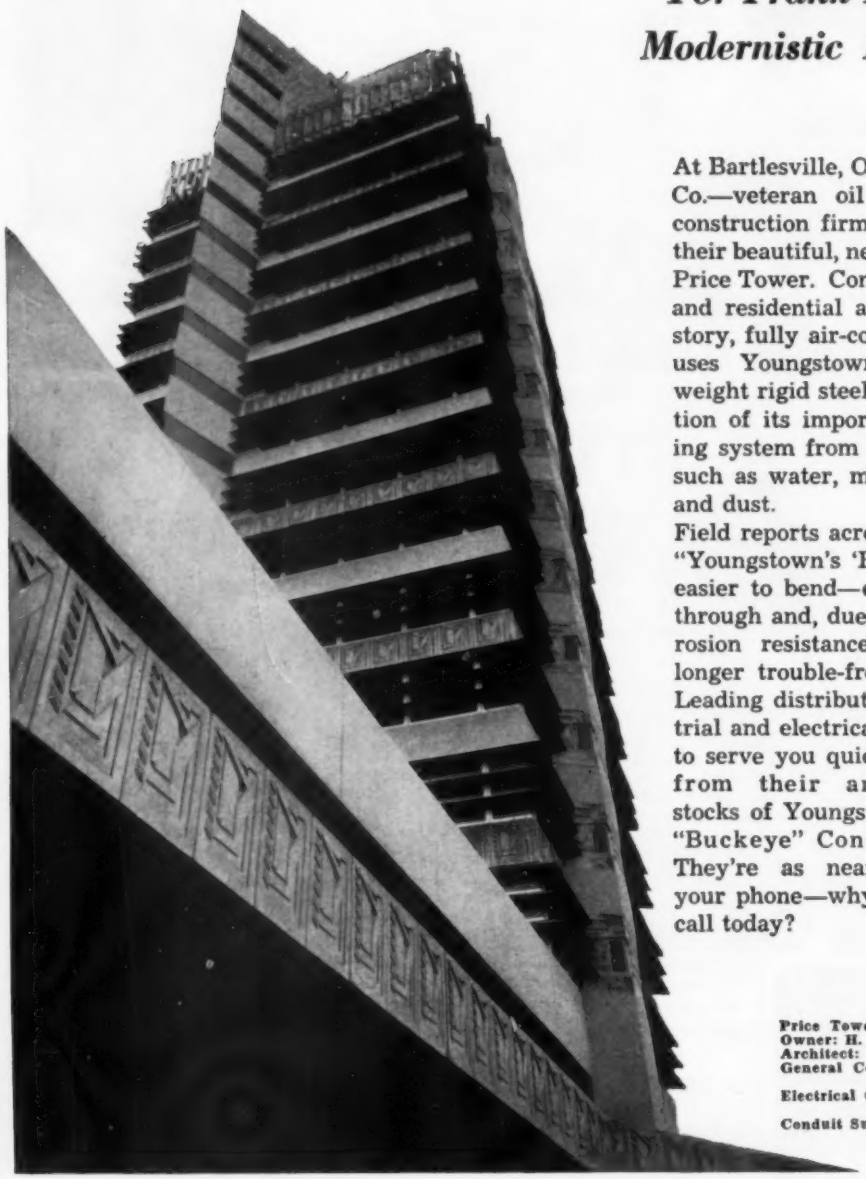
ADDRESS.....

CITY.....STATE.....

GENERAL ELECTRIC

YOUNGSTOWN "BUCKEYE" CONDUIT

. . . Provides Lifetime Wiring Protection For Frank Lloyd Wright's Modernistic Price Tower



At Bartlesville, Okla., the H. C. Price Co.—veteran oil and gas pipeline construction firm — recently opened their beautiful, new cantilever-design Price Tower. Containing both offices and residential apartments, this 19-story, fully air-conditioned structure uses Youngstown "Buckeye" full-weight rigid steel conduit for protection of its important electrical wiring system from damaging elements such as water, moisture, vapor, dirt and dust.

Field reports across-the-nation state: "Youngstown's 'Buckeye' Conduit is easier to bend—easier to fish wires through and, due to its superior corrosion resistance, affords a much longer trouble-free service life."

Leading distributors in every industrial and electrical market are ready to serve you quickly and efficiently from their ample stocks of Youngstown "Buckeye" Conduit. They're as near as your phone—why not call today?

QUALITY YOUNGSTOWN SERVICE

Price Tower, Bartlesville, Okla.
Owner: H. C. Price Co.
Architect: Frank Lloyd Wright
General Contractor: Culwell Construction Co., Oklahoma City, Okla.
Electrical Contractor: Industrial Electric Co., Oklahoma City, Okla.
Conduit Supplier: Westinghouse Electric Supply Co., Oklahoma City, Okla.



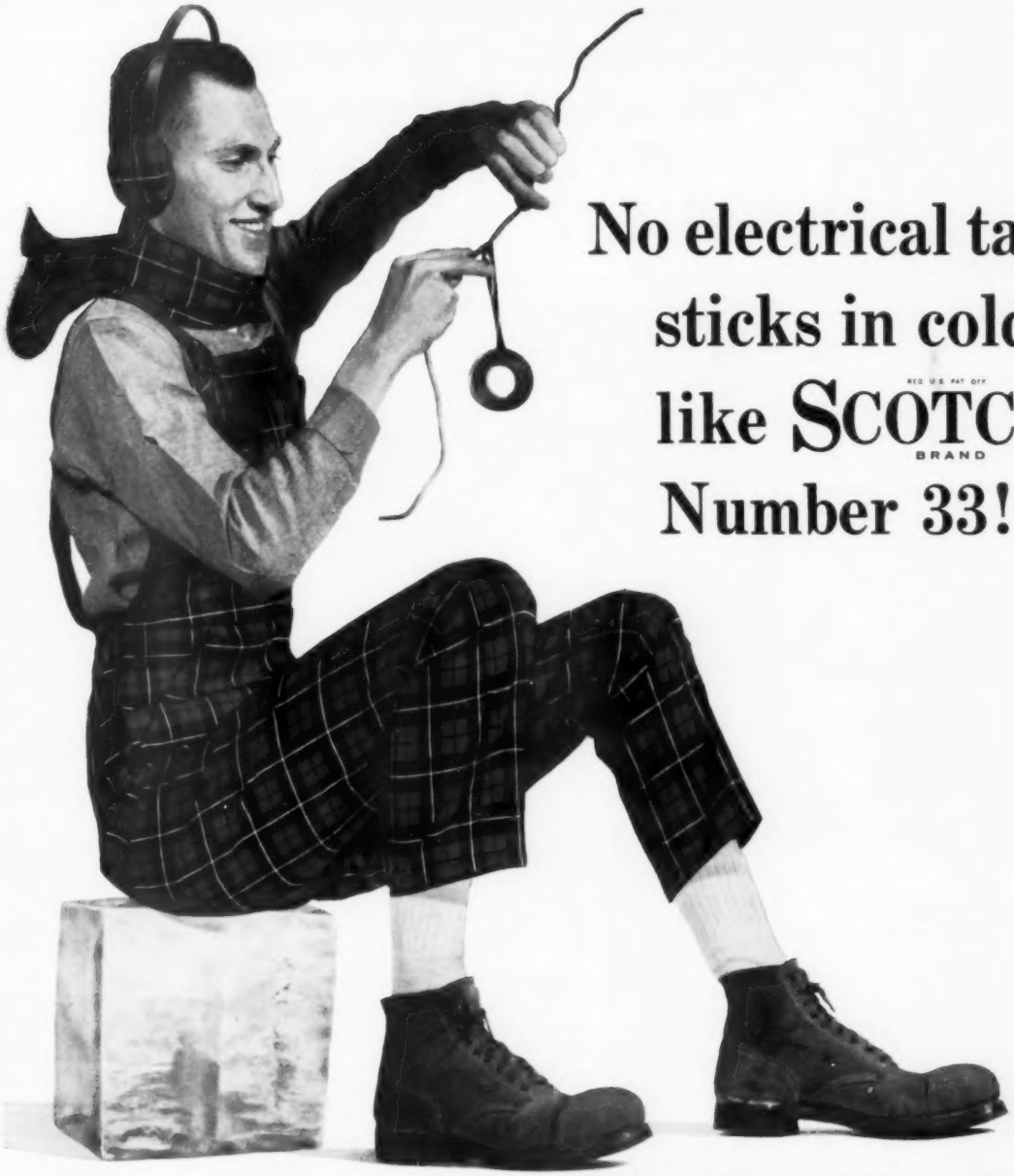
Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities



No electrical tape sticks in cold like SCOTCH BRAND Number 33!

REG. U.S. PAT. OFF.

THE PRICE PER SPLICE IS LESS!

let us prove it!

Minnesota Mining and Manufacturing Co.
St. Paul 6, Minnesota

Okay . . . I'm from Missouri. Send someone around to *show* me that the price per splice of "SCOTCH" No. 33 is less!

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



REMEMBER, it's not the original "SCOTCH" Brand No. 33 Electrical Tape unless it has "Scotty's" plaid on the can and "No. 33" inside the red core. Ask your distributor about the full line of "SCOTCH" Brand splicing materials.

"SCOTCH" and the plaid design are registered trademarks of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

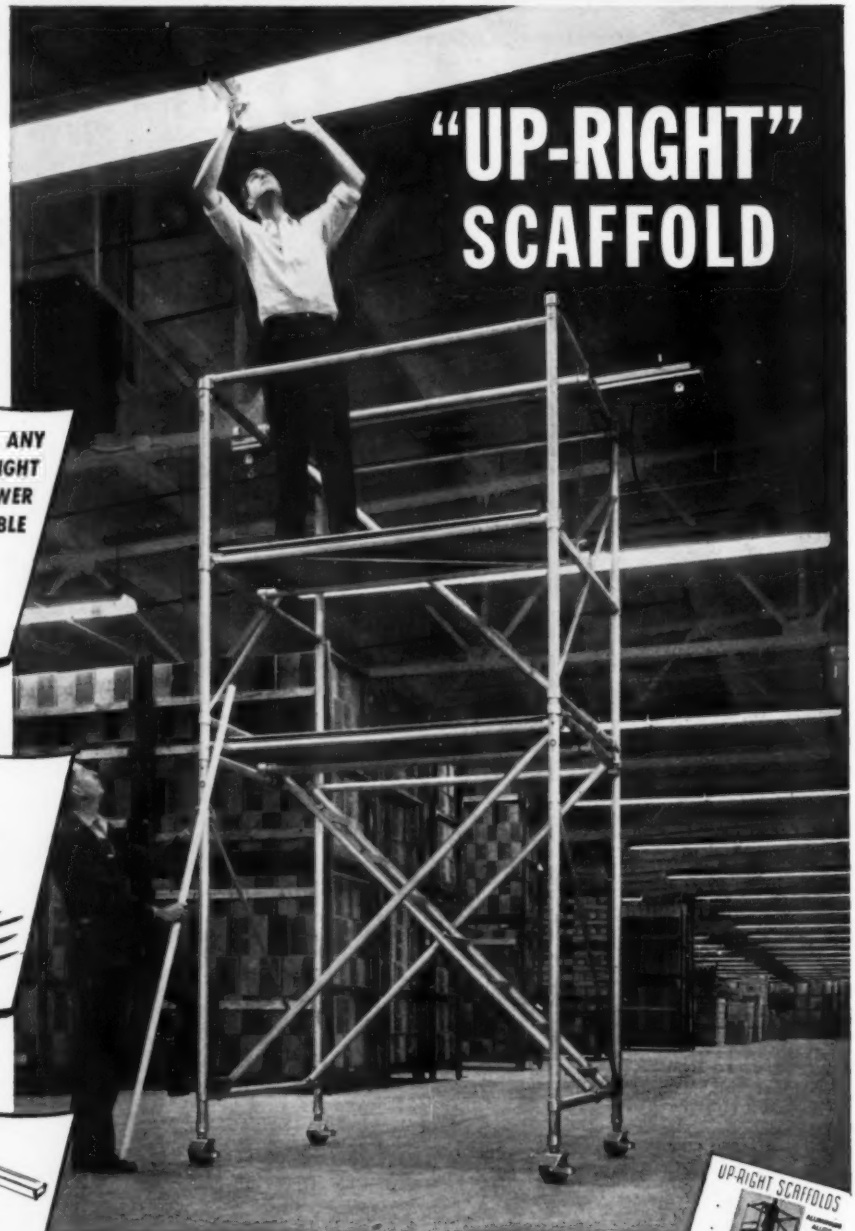
3M COMPANY



WALTER D. VANCE, JR., *Vice President* • *California Electric Co., reports:*

"We saved 14 days installing 527 fixtures by using 'UP-RIGHT' Scaffold-on-Wheels"

Man-hour savings on this General Motors warehouse job amounted to over 40%. Up-Right Scaffold is so light it is easily assembled by one man. Individual 1 piece aluminum alloy sections are unfolded and set one on top of the other. They lock into place instantly.











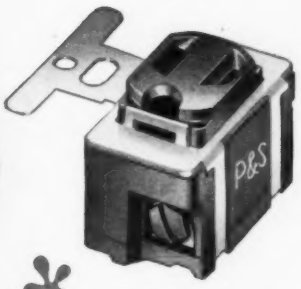
Write for descriptive circular ➡

"UP-RIGHT" SCAFFOLDS

Dept. 159 • 1013 Pardee Street • Berkeley, California

Factories: Berkeley, Calif. and Teterboro, N. J. • Offices in all principal cities

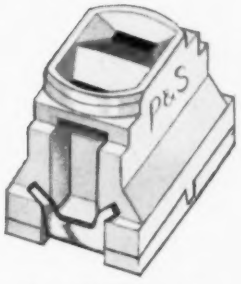
3 NEW DEVICES IN THE P&S DESPARD LINE



* (No. 1332 Grounding Outlet)
(No. 1432 Ivory)



(No. 1374 Neon Pilot Light)
(No. 1474 Ivory)



(No. 1425 Single Outlet)
(No. 1325 Brown)

* *Including* A NEW GROUNDING OUTLET

Now the wide range of P&S-Despard wiring devices is extended for even greater versatility with the new grounding outlet No. 1332. Nos. 1325 and 1374 have pressure terminals. Like all P&S-Despard units, they're thoroughly tested for long dependable life. A turn of the cam on the Despard Camstrap quickly locks-in combinations of any two or three Despard units. Custom-make your installations to meet the specific needs of your wiring job—with the original and complete P&S-Despard line.

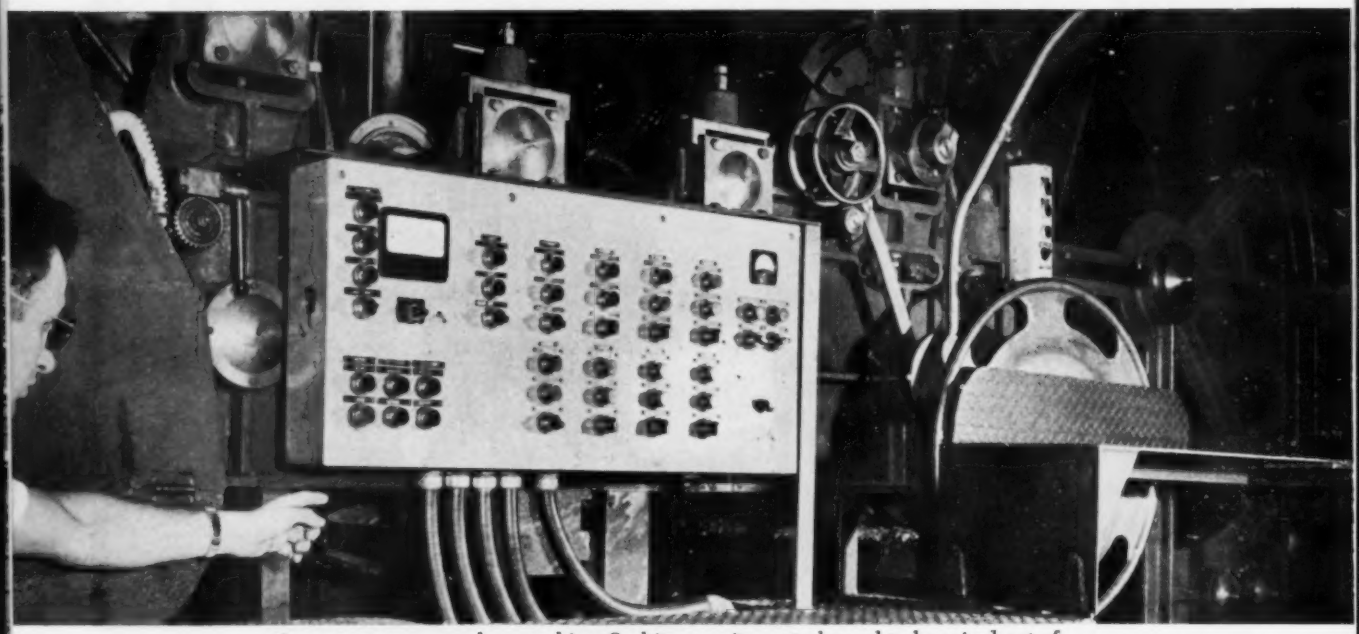
Send for catalog page on these new devices, Dept. ECM358

P&S®

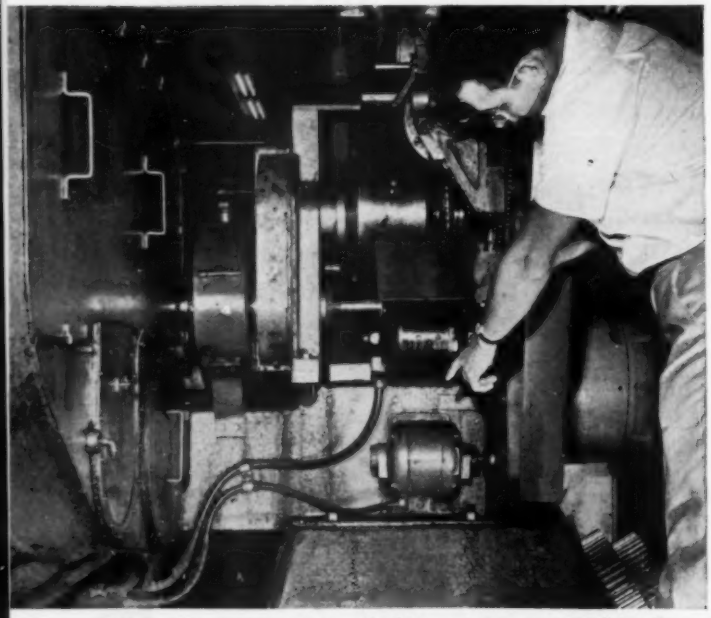
PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK
60 E. 42nd St., New York 17, N. Y. 1440 N. Pulaski Rd., Chicago 51, Ill.
In Canada; Renfrew Electric Limited, Renfrew, Ontario

MAKE THE COMPLETE JOB *COMPLETELY* P&S

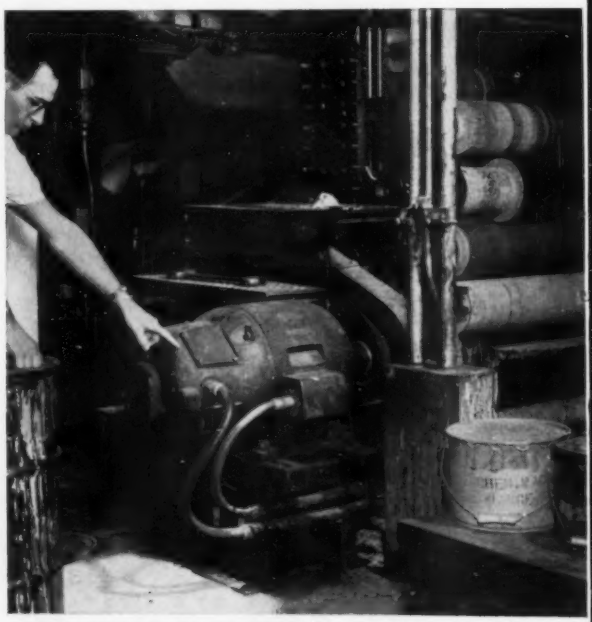
Can you count how many liquid-tight conduit saves



1. **On high-speed** bag machine, Sealtite permits control panel to be raised out of position, for replacement of rollers, without time-consuming removal of wiring. Sealtite flexes without fail, gives wiring sure protection.



4. **On tubing machine,** Sealtite resists a constant drip of oil from the differential over the motors, and from the motor drive chains. Wires are protected!

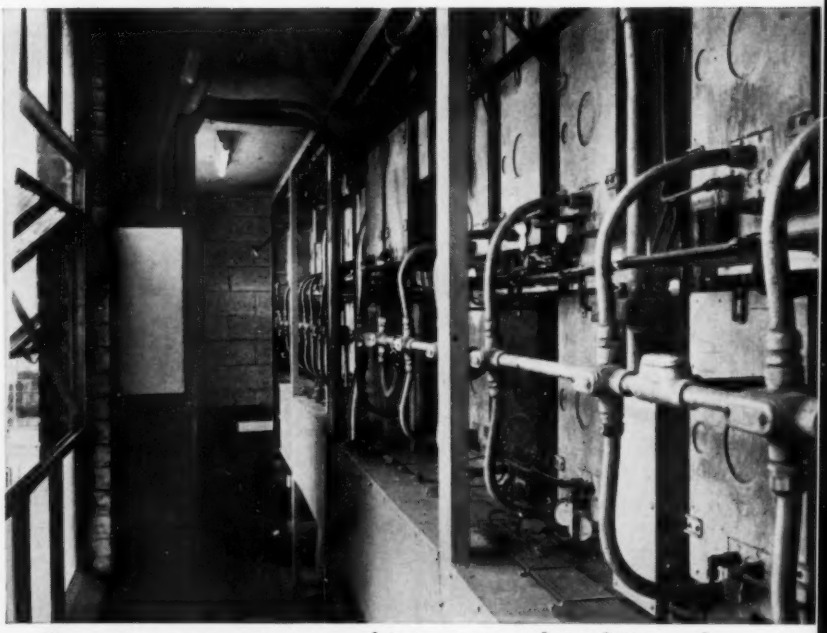


5. **Flexible Sealtite** conduit permits easy adjustment of tension of V belt on all belt-driven machines throughout plant, speeds work.

ways Sealtite flexible, money in this pulp mill?



2. **In paste room,** Sealtite protects wiring on fan located directly over steam vat. Sealtite withstands steam and high heat.



3. **Sealtite installed on back** of instrument panel saved time and money by eliminating time-consuming bending and fitting of rigid conduit. Notice neat appearance of this Sealtite installation!

Sealtite can probably save you more than you realize, too!

There are at least a dozen common plant situations where Sealtite* flexible, liquid-tight electrical conduit saves time, trouble and money.

In wet spots, dust spots, corrosive spots—Sealtite's tough vinyl jacket gives *sure* protection to wiring. In corrosive atmospheres, Sealtite stands up where metal conduit is easily knocked out!

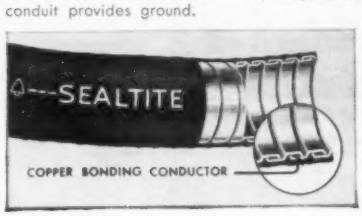
Where wiring must flex, move, or absorb vibration—Sealtite flexes without failure.

Sealtite, too, is easy to install in cramped spaces . . . hugs contours . . . makes a neat appearance . . . saves the time it takes to cut, bend and fit rigid conduit . . . cuts "down-time" when electrical gear must be moved.

Where to get Sealtite – Electrical Wholesalers stock Types U.A. and E.F.† Sealtite in black or gray. Be certain you ask for and get the quality conduit marked "Sealtite" on the cover. Buy it in long lengths on reels or in cartons and cut it on the job without waste. Your wholesaler also stocks liquid-tight connectors. Free Booklet S-538 gives full information on Sealtite. Write: The American Brass Company, American Metal Hose Division, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. Sealtite is approved by Canadian Standards Association.

*Trademark †Pat. Applied For 57108

Cutaway of Type U.A. Sealtite shows tough polyvinyl chloride jacket over flexible metal core. Copper conductor wound spirally inside conduit provides ground.



Insist on the conduit marked

SEALTITE

flexible, liquid-tight conduit

an ANACONDA® *product*

up, UP again!

. . . goes every INDUSTRIAL LIGHTING UNIT SPECIFICATION in the NEW RLM BOOK



NEW *specifications for Special Service fluorescent units!*

NEW *specifications for units utilizing 800 ma. fluorescent lamps!*

NEW *incandescent reflector sizes!*

NEW *lighting curves and data for every RLM Specification!*

NEW SPECIAL SERVICE UNITS feature one-piece, all-porcelain enamel, housing to withstand moisture, dusty atmospheres.

NEW [illegible] UNITS Now you can specify [illegible] for 800 ma. fluorescent lamps that produce 40% more light.

NEW INCANDESCENT SPECS for industrial units include an increase in number of available sizes; additional applications.

NEW MOUNTING SPECS for fluorescent, cover individual and continuous row tandem mountings; simplify installation.

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This label identifies the RLM-certified lighting equipment of 26 leading manufacturers

R-234



INSULATED CONNECTORS

THE NEW CONCEPT IN FITTINGS THAT REDUCES WIRE PULLING EFFORT UP TO 50%



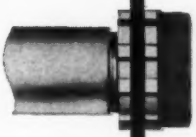
Insulating Bushing



Insulated Metallic Bushing*



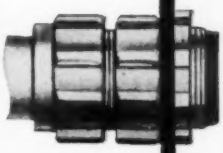
Insulated Chase Nipple



STANDARD RIGID CONDUIT



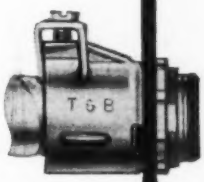
Insulated EMT Connector



ELECTRICAL METALLIC TUBING



Insulated Tite-Bite Connector — straight



FLEXIBLE CONDUIT OR ARMORED CABLE



Insulated Tite-Bite Connector — 90°

*available soon

Look for the bright blue insulation

ANOTHER NEW T&B ENGINEERED EXCLUSIVE —
The First Line of Self-Insulated Raceway Fittings! Just look at the many benefits you get with these new "insulined" fittings.

They are the *EASIEST* to Install

Factory-assembled, the Insuliner is a permanent part of the fitting — it can never come loose or pull out. The slippery insulined throat cuts pulling effort by as much as 50%.

They make the *SAFEST* Installation

Because of the nationwide accent on safety, the trend is toward insulated fittings in all locations. Insulated bushings are standard fittings today. Extremely tough they are unaffected by common acids, solvents, moisture or fumes.

They make the *MOST ECONOMICAL* Installation

A one-piece fitting makes installation fast and easy for maximum on-the-job savings. There is no need to add a separate insulating bushing.

They give the Installation a *QUALITY LOOK*

Strong, longer bodies and heavy lock nuts... 100% visibility... accurate threading... all of the features you've come to expect in a T&B engineered fitting.

Write for free samples and technical data or contact your nearby T&B Distributor.

LOOK FOR THIS SIGN —

AUTHORIZED DISTRIBUTOR T&B ENGINEERED

All T&B insuline fittings bear Underwriters Laboratories Approval

IT'S THE MARK OF AN AUTHORIZED T&B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T58

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MANUFACTURERS OF QUALITY ELECTRICAL FITTINGS SINCE 1898

MICRO SWITCH Precision Switches



A recent MICRO SWITCH advertisement in Business Week directed to management

Top Business Management wants this simple automation . . .

You can provide it profitably!

The management advertisement reproduced here tells management that—"automation can be simple, practical, and inexpensive. Any plant can automate its present equipment by departments, at very little cost." And the reader is referred to you . . . the industrial electrical contractor.

There is plenty of profitable business for you among your present customers and prospects in automating all kinds of plant equipment the simple MICRO SWITCH way. We'll help you, through our highly developed staff of Field Sales Engineers and the hundreds of Authorized MICRO SWITCH Distributors.

Send for catalogs #83 and #101, and Bulletin 20 on "Plug-In Limit" switches.

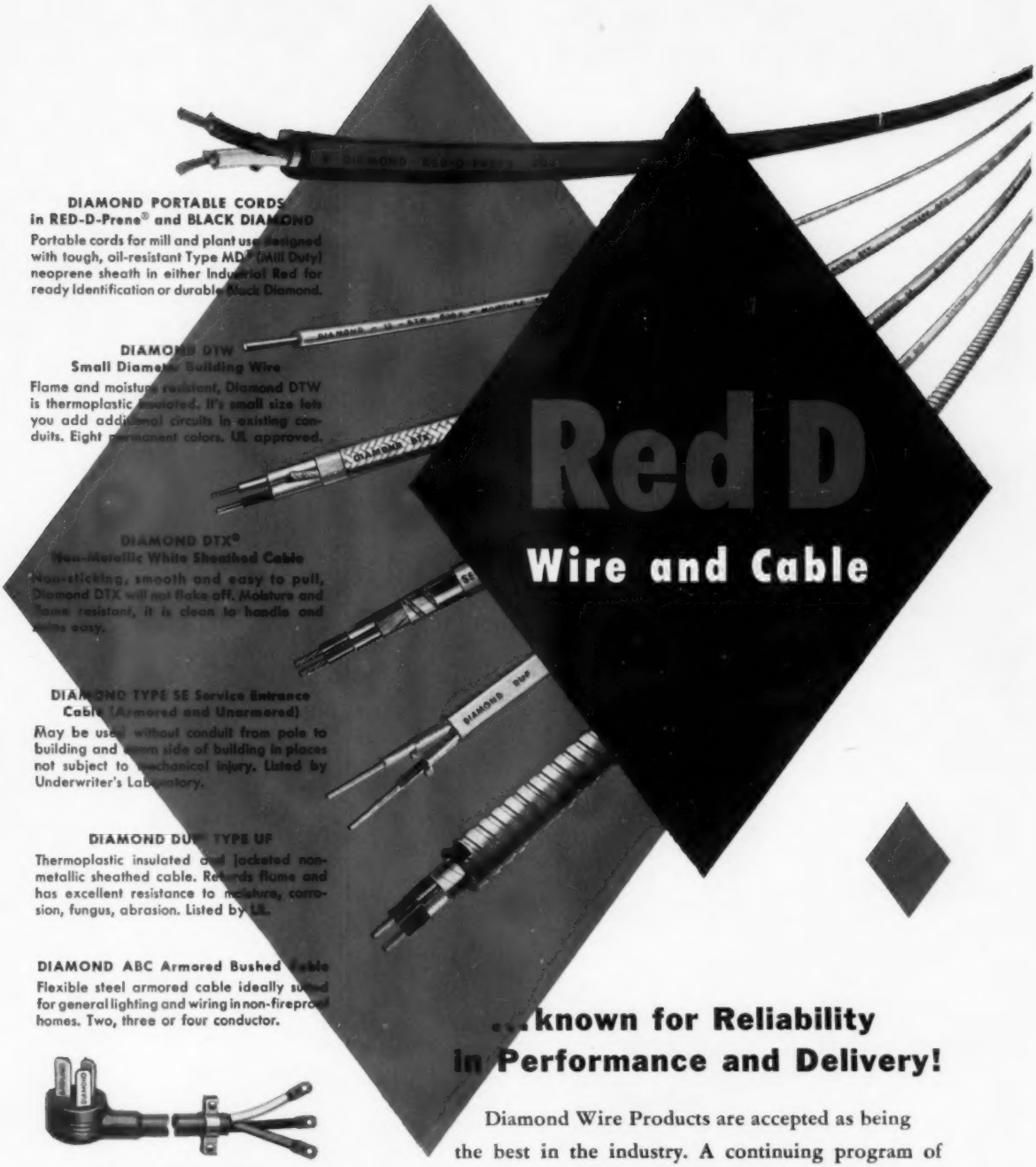
The two-word name "MICRO SWITCH" is NOT a generic term. It is the name of a division of Minneapolis-Honeywell Regulator Company.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

First in Precision Switching



DIAMOND PORTABLE CORDS in RED-D-Prene® and BLACK DIAMOND

Portable cords for mill and plant use designed with tough, oil-resistant Type MD (Mill Duty) neoprene sheath in either Industrial Red for ready identification or durable Black Diamond.

DIAMOND DTW Small Diameter Building Wire

Flame and moisture resistant, Diamond DTW is thermoplastic insulated. It's small size lets you add additional circuits in existing conduits. Eight permanent colors. UL approved.

DIAMOND DTX® Non-Metallic White Sheathed Cable

Non-sticking, smooth and easy to pull, Diamond DTX will not flake off. Moisture and flame resistant, it is clean to handle and wires easy.

DIAMOND TYPE SE Service Entrance Cable (Armored and Unarmored)

May be used without conduit from pole to building and down side of building in places not subject to mechanical injury. Listed by Underwriter's Laboratory.

DIAMOND DUF® TYPE UF

Thermoplastic insulated and jacketed non-metallic sheathed cable. Retards flame and has excellent resistance to moisture, corrosion, fungus, abrasion. Listed by UL.

DIAMOND ABC Armored Bushed Cable

Flexible steel armored cable ideally suited for general lighting and wiring in non-fireproof homes. Two, three or four conductor.

DIAMOND RANGE CORD SET

Diamond three-wire range cord sets are 36" long. Have rubber molded cap, molded on rubber jacketed cable—are complete with steel strain relief. UL approved.

...known for Reliability in Performance and Delivery!

Diamond Wire Products are accepted as being the best in the industry. A continuing program of production control, research and product development helps maintain this reputation. And when your order for a Diamond product comes in . . . the goods go out, promptly and with no delay.

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WIRE AND CABLE COMPANY
Sycamore, Illinois
Birmingham, Alabama

"NEW EP DRY-TYPE TRANSFORMER CUTS SPACE 50% IN OUR GENERATOR SAYS LUMEN, INC.,



CONTROL MODIFICATION KIT," OF JOLIET, ILLINOIS

"Using Westinghouse EP dry-type transformers in our modification kit, we have obtained improved performance, at the same time reducing space requirements by 50%, resulting in savings in raw materials, assembly, shipping and installation of the modification kit," states K. C. Staskon, Vice President of Engineering for Lumen, Inc.

Mr. Staskon adds, "The EP meets all of our specification requirements for performance and reliability."

"The smaller size and lighter weight of the Westinghouse EP's, plus the fact that they can be mounted in any position, make them the most versatile units available for our purposes," concludes Mr. Staskon.

Lumen, Inc., applies the EP transformer to control energizing functions for:

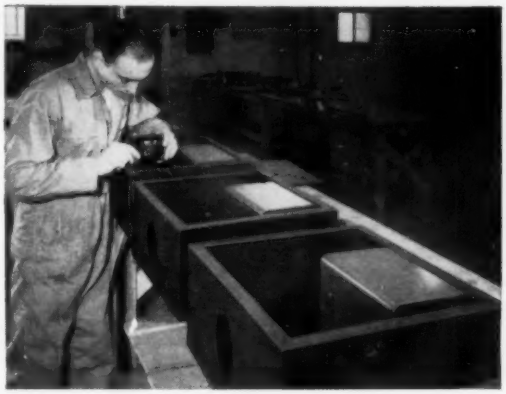
- Westinghouse Type DB-25 electrically operated circuit breaker.
- governor control motor of diesel generator set.
- diesel engine safety shut-down circuits.
- elapsed-time meter and frequency meter utilized in maintenance and operational control.

EP transformers are safe — listed by Underwriters' — and remarkably quiet. The 5-kva units test below 35 decibels . . . just a whisper away from silence.

For complete information on the EP transformer, call your local or nearby Westinghouse distributor . . . or write Westinghouse Electric Corporation, P.O. Box, 868, Pittsburgh 30, Pennsylvania. J-70864



Lumen, Inc., Vice President of Engineering K. C. Staskon watches check-out of modification kit components.



EP transformer — the smallest and most efficient unit available for the purpose — being installed in modification kit.

Engineer tests modification kit utilizing Westinghouse EP dry-type transformer. Lumen, Inc., Joliet, Illinois manufacturer, has used the kit as part of a conversion design to double the capacity of over 150 engine generator units.

YOU CAN BE SURE...IF IT'S

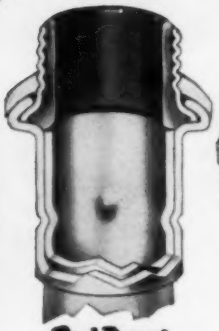
Westinghouse

B-M

the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*



Red Throat
Insulated
Connector



Red Throat
Cross section







"BM" #100
Cutter for ½, ¾
and 1" E.M.T.



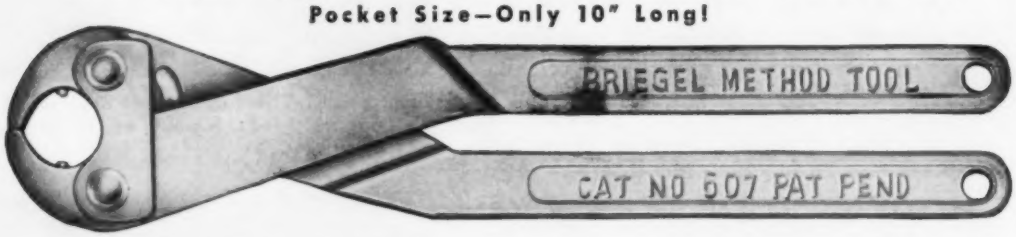
"BM" #1000
Holder for ½, ¾
and 1" E.M.T.



"BM" #600
Changeable Jaw Indenter

THE NEW BM607 INDENTER FOR ½" FITTINGS

Pocket Size—Only 10" Long!



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All B-M Indenter Fittings are U.L. Approved as concrete-tight and all Compression Fittings as rain-tight as well as for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

TELESCOPE BM SYSTEM

BRIEGEL METHOD TOOL CO.

GALVA, ILLINOIS

can you afford to leave your conduit in storage?



YOU CAN IF IT'S PITTSBURGH STANDARD'S HOT-DIP GALVANIZED WITH HOT-DIP GALVANIZED THREADS

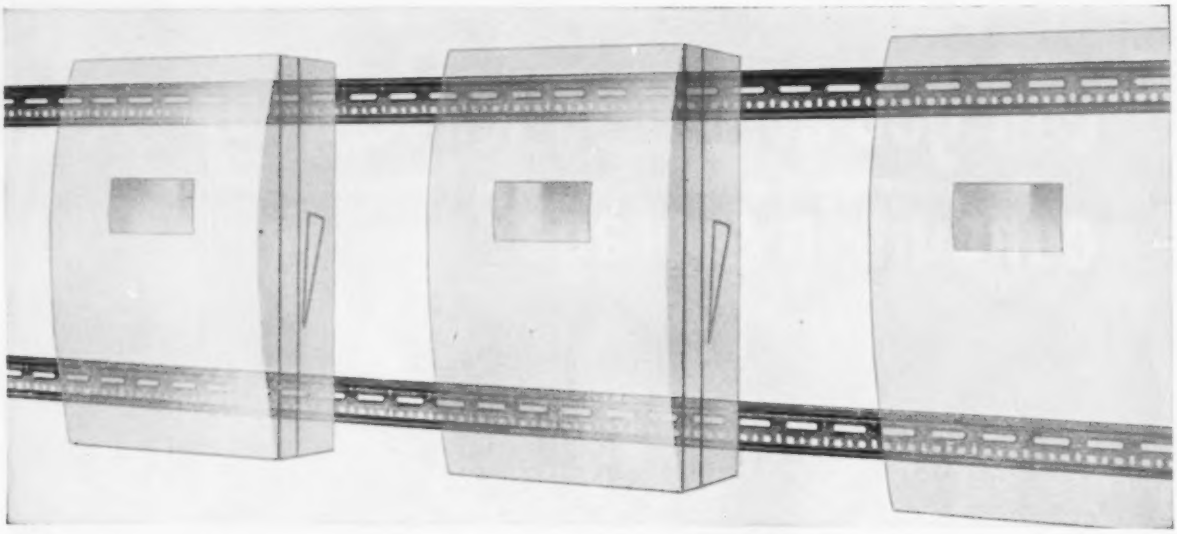
The extra labor, the extra time that it takes to chase rusty threads on conduit which has lain in storage is very costly. It very often nullifies the savings realized through purchases made ahead of price adjustments. That's why Pittsburgh Standard's exclusive Hot-Dip Galvanized Conduit with *hot-dip galvanized threads* is the least expensive conduit . . . always ready to use . . . threads just can't get rusty. And because of the industry's most automatic conduit mills, this conduit with color-coded thread protectors on ½ through 6 inch sizes is available at no extra cost! Get delivery and price information by calling or writing your nearest Pittsburgh Standard wholesaler or *Pittsburgh Standard Conduit Co., 61 Bridge Street, Pittsburgh 23, Pa.*



PITTSBURGH STANDARD CONDUIT CO.

PLANTS AT MORRISVILLE & ETNA, PA.

RIGID STEEL CONDUIT • ELECTRICAL METALLIC TUBING • ELBOWS • COUPLINGS • FITTINGS



Reduce Electrical Installation Costs . . . frame with

ACME STEEL DEXION SLOTTED ANGLE

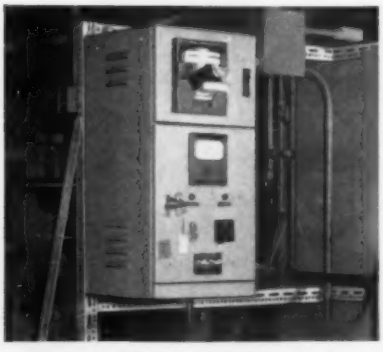
Why Acme Steel Dexion cuts installation costs: Dexion Slotted Angle frames so conveniently because the scientifically engineered slot and hole patterns always match up; electrical components can be mounted so easily on a Dexion frame because a slot or hole is always available. You can install multiple components of relays, instruments or switchgear without wasting time in drilling or welding.

Dexion Slotted Angle projects are started and completed at the job site—it measures, cuts and bolts in fast, simple succession with amazing speed. A single downstroke of the Dexion Cutter shears squarely and cleanly; a single wrench draws up all bolts.

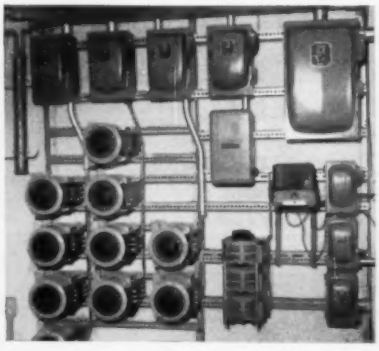
Acme Steel Dexion Slotted Angle is strong—rigidly holds many hundreds of pounds—and is available in either standard or heavy-duty gauge. Edge-smooth, cold rolled Acme Steel Dexion is galvanized for rust and corrosion resistance, is completely re-usable, over and over.

Many contractors regularly depend on Acme Steel Dexion because of its versatility, lightweight strength and compactness. Dexion Slotted Angle comes in 10 or 12-foot lengths, ten pieces to a package which includes 75 nuts and bolts and takes less than the space of two 2 x 4's.

Learn how Dexion Ideas have cut costs for others. Write, today, for framing ideas and the name of your distributor to Dept. EBD-38, Acme Steel Company, Chicago 27, Illinois.



ACME STEEL Dexion Slotted Angle supports electrical control panel for production line.

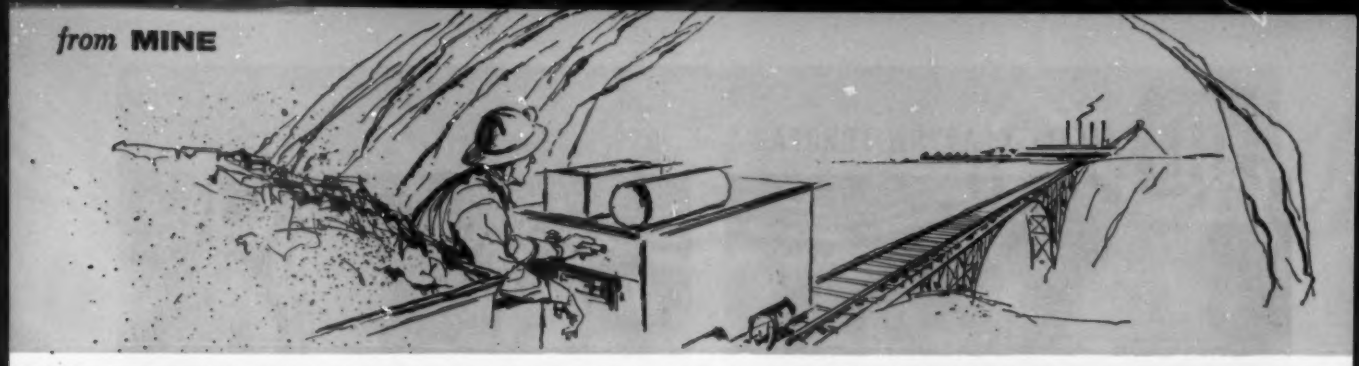


ACME STEEL Dexion Slotted Angle frames instrument control housing and switch gear.



ACME STEEL Dexion Slotted Angle speeds installation of lighting fixtures.

ACME STEEL DEXION SLOTTED ANGLE





to **YOU**



ONE SURE SOURCE OF SUPPLY

for all your wire and cable needs

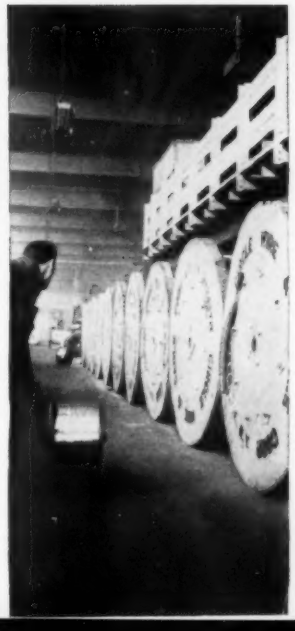
Quality products, ample stocks, dependable deliveries—that's what you get when you work through a Circle distributor.

Quality products—because Circle controls every step in manufacturing—from the copper, lead, and zinc mined and refined by Cerro de Pasco down to the finished wire and cable—

Ample stocks—because Circle is one of the country's largest producers with over a billion feet of quality building wire and cable rolling out of its huge plants yearly—

All-out service—because that's a basic policy at Circle, a policy which has earned Circle its reputation for giving fast, friendly, dependable service where and when it's needed.

Why don't *you* make a Circle distributor your "one sure source of supply." Many other satisfied contractors do.

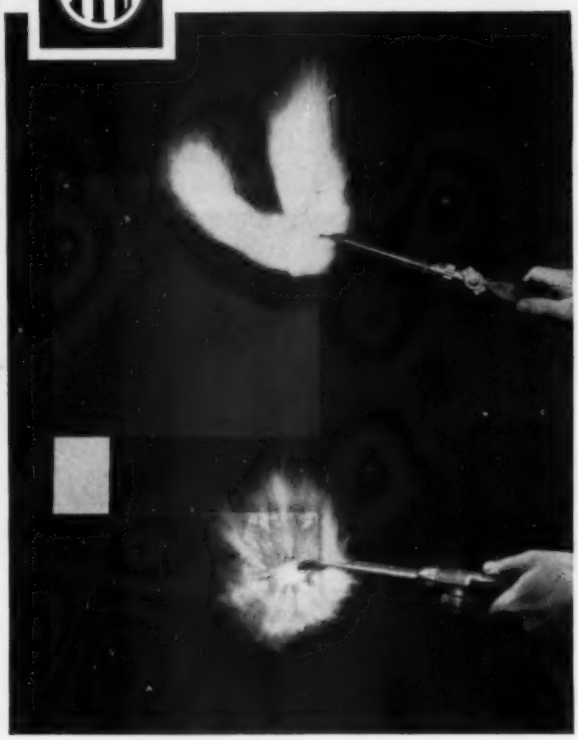


C W C **CIRCLE** **WIRE & CABLE**
a subsidiary of
CERRO DE PASCO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** in all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

METAL-CLAD SWITCHGEAR



TORCHES IGNITE FLAMETRAP (bottom) and conventional insulation (top) simultaneously.



SECONDS LATER, FLAMETRAP has snuffed out, but conventional insulation still burns briskly.

New FLAMETRAP Insulation Snuffs Out Flame ...No Toxic Gases...Highest Arc Resistance



FLAMETRAP INTERPHASE BARRIER. Standard equipment on I-T-E 5 and 15 kv switchgear at no increase in price.

Take the heat away, and this new I-T-E developed **FLAMETRAP** insulation snuffs out . . . fast! This is today's most advanced flame-retardant insulation, and it is used exclusively in I-T-E Switchgear.

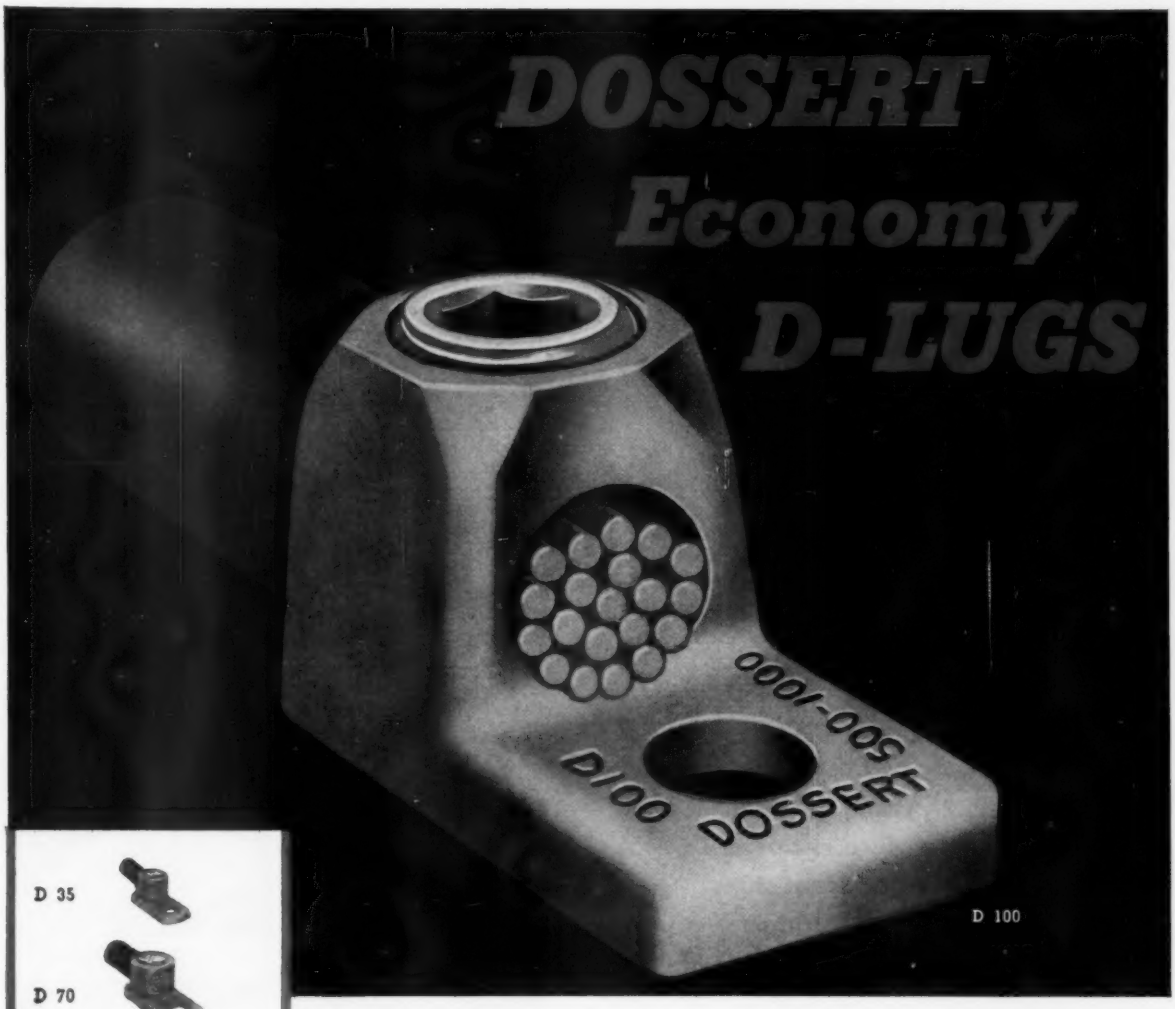
FLAMETRAP contains melamine resin—heretofore considered too expensive for commercial application. Unlike substitute ingredients, melamine gives off no toxic gases when it burns. So **FLAMETRAP** is far safer. And melamine stands up better under high temperatures. So **FLAMETRAP** suffers less from arc damage.

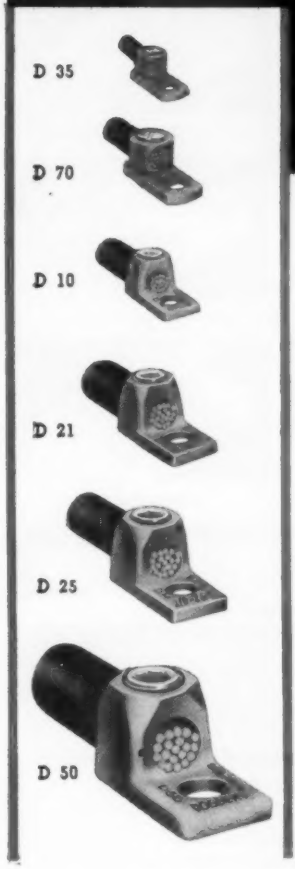
This latest improvement puts I-T-E switchgear even further ahead of the pack. It is one more of the quality details that keep coming your way from I-T-E without increase in price.

I-T-E service is as near as your telephone or mailbox. Why not call or write today. I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada, Eastern Power Devices Ltd., Port Credit, Ont.

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DOSSERT Economy D-LUGS





Here is a complete and low-priced line of D-LUGS. These connectors are more compact and heavier in weight to insure cooler operation under more severe loads, while being much easier to install. Only seven sizes accommodate from 14 SOL. to 1,000,000 CM.

FEATURES:

- **Rugged construction**
- **Made of high conductivity copper alloy**
- **Suitable for all purposes**
- **Variable, each connector takes wide range**
- **Exceptionally compact**
- **Reusable**

Write for detailed information and prices!

50 YEARS OF TECHNICAL KNOW-HOW

DOSSERT MFG. CORP.

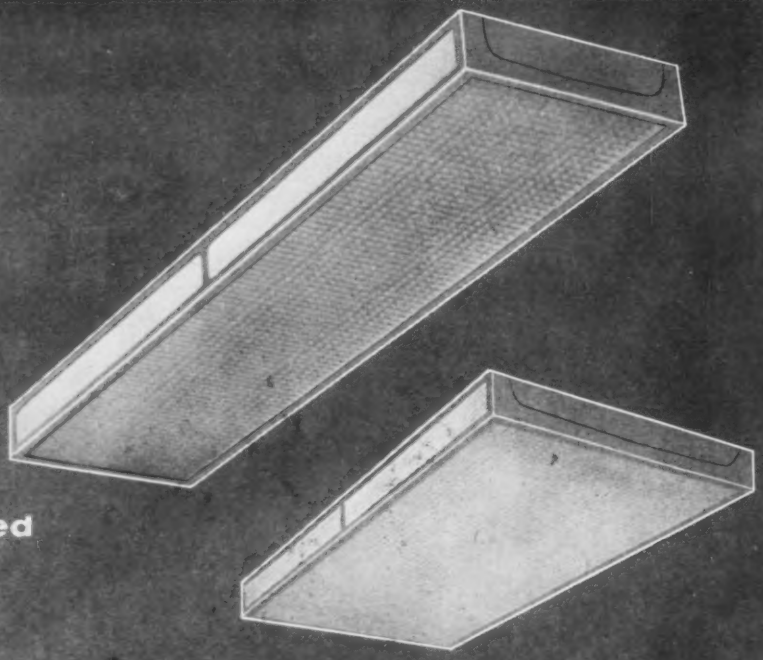
249 Huron Street, Brooklyn 22, N. Y. Representatives in all principal cities

IN CANADA: W. S. Gerrie & Assoc., Ltd., Toronto

Introducing GARCY Lighting's

60th ANNIVERSARY SERIES

New Surface-Mounted Fixtures

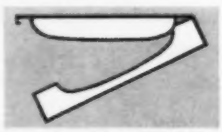


- 2 or 4 lamp units, only 3½" deep
- Hinged one-piece enclosures
- Regular or translucent sides
- For 48" rapid start lamps

Especially suitable for modern low ceilings, the 60th Anniversary Series embodies simplicity in design, glare-free visual comfort and efficient light utilization. This versatile series offers unique advantages to cost-conscious contractors.

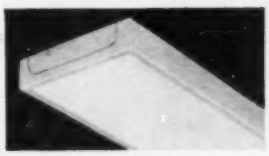
ONLY TWO BASIC PARTS TO INSTALL

1. Compact Chassis
2. One-Piece Enclosure

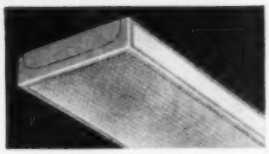


The lightweight chassis is easy to handle. Hinged enclosure is furnished ready for installation . . . no small parts to assemble.

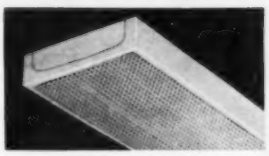
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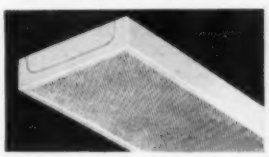
ONE-PIECE PLASTIC LOUVER



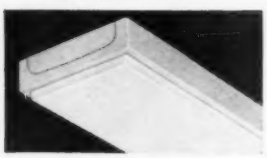
EXTRULITE CLEAR PLASTIC



FLAT PLEXIGLAS PANEL



LOW BRIGHTNESS LENS



DISHED PLASTIC



TRANSLUCENT SIDES



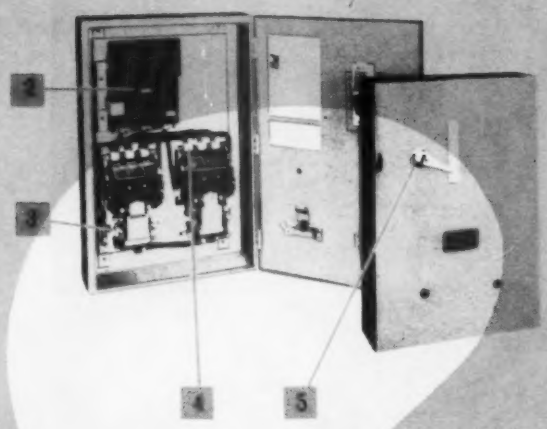
REGULAR SIDES

GARCY

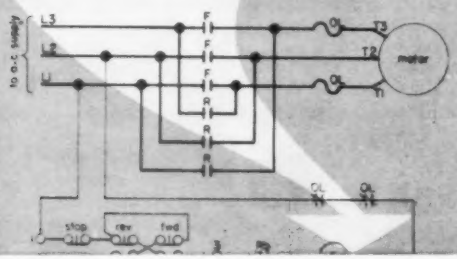
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NEW
WESTINGHOUSE CONTROL CATALOG

class 11216 | product description | price information | class 11-216



wiring diagram



volts 60 cycles	max. hp.	NEMA size	circuit breaker amps and frame size	NEMA 1 general purpose catalog number	NEMA 4 water-tight catalog number
3 phase - 3 pole					
110	½	0	15E	SOANNA	W1ANNA
	1	0	20E	S0BNNA	W1BNNA
	2	0	30E	S0DNNA	W1DNNA
	3	1	40E	S1FNNA	W1FNNA
	3	1	50E	S1GNNA	W1GNNA
	5	2	70E	S2HNNA	W2HNNA
	10	2	100E	S2JNNA	W2JNNA
	15	3	100F	S3JNNA	W3JNNA
	25	4	200J	S4NNNA	W4NNNA
220	1	0	15E	S0ANNB	W1ANNB
	3	0	20E	S0BNNB	W1BNNB
	3	1	30E	S1DNNB	W1DNNB
	7½	1	50E	S1GNNB	W1GNNB
	10	2	70E	S2HNNB	W2HNNB
	15	2	100E	S2JNNB	W2JNNB
	30	3	100F	S3JNNB	W3JNNB
	50	4	200J	S4NNNB	W4NNNB
440	5	0	15F	S0ANNC	W1ANNC
	5	1	30F	S1DNNC	W1DNNC
	10	1	40F	S1FNNC	W1FNNC
	25	2	50F	S2GNNC	W2GNNC
	50	3	100F	S3JNNC	W3JNNC
	100	4	200J	S4NNNC	W4NNNC
550	5	0	15F	S0ANND	W1ANND
	5	1	20F	S1BNND	W1BNND
	10	1	30F	S1DNND	W1DNND
	10	2	40F	S2FNND	W2FNND
	25	2	50F	S2GNND	W2GNND
	50	3	100F	S3JNND	W3JNND

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No. 3 in a series

Right off the Wire

A new system using multiple cathodes is said to double the life of the vapor lamps used on highways.

&

A thermionic converter has been made that produces electricity directly from heat with an efficiency of eight per cent.

&

Studies of the northern lights being made with a high-powered, long-range radar may disclose a method of defense against missiles coming over the arctic.

&

Submarine cable can be made in any length at the Simplex Submarine Cable Division's dockside plant. Single lengths are limited only by the capacity of a cable ship's hold, or the length of a train of gondola cars.

&

An electronic system of bank record keeping handles random-sized, unpunched paper checks at the rate of 1800 checks per hour to 40,000 accounts.

&

The world's largest solar furnace is being designed for installation in New Mexico. It will produce temperatures as high as 8,000°F.

&

Elimination of thermal noise by operating microwave amplifiers at the temperature of liquid helium has been found to greatly increase the range of radar.

&

An electronic map plotter is expected to make possible more accurate and cheaper maps from aerial photographs and to lend itself to the automation of mapping.

&

Plans are being made to mount telescopes on balloons in order to make observations above the interference of the earth's atmosphere.

&

The U. S. Air Force has patented an infrared television camera for use at night or in fog.

A new chemical plant will need no outside source of fuel after operation has begun. All the heat required will come from the process.

&

It has been found that one area of the human brain contains a record of every detail of the person's experience. Total recall can be produced by the stimulation of a minute electrical pulse.

&

Phosphors applied to textiles, sheet materials or metal mesh light up when a current is passed through them thus making draperies, for example, sources of illumination.

&

A new microscope for the study of living tissues uses bursts of ultraviolet light too brief (one thousandth of a second) to injure the tissue. The image appears in color on a television screen.

&

A new drug promises to save the lives of many persons who might otherwise die from lethal doses of radiation. It has been tried only on laboratory animals.

&

A form of fiber glass containing uranium 235 has been developed as a fuel for atomic furnaces.

&

A new amplifier is expected to extend the range of radio telescopes about ten times, enough to equal the best optical instruments.

&

A giant air mattress, equipped with arresting and launching gear, has been patented for use as a portable airstrip. On it planes could make belly landings without damage.

&

Tellurium lead cable sheath has excellent vibration, creep and age-hardening resistance, and greater flex life and tensile strength than other lead alloys, say Simplex scientists after exhaustive tests.

A new meter for oil pipelines will measure a flow of 10,000 barrels per hour (four times the capacity of present equipment) with an accuracy of one tenth of one per cent.

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Simplex C-L-X (Sealex) metallic sheath is manufactured with thermoplastic covering in colors for voltage or general industrial coding.

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A device called an "electronic sentry" guards against fire, abnormal pressure, high or low water levels, temperature changes and other hazards. It calls a designated person by telephone and gives a pre-recorded message.



"Tree" of Knowledge

This strange looking growth tells an important story to the expert eyes of Simplex scientists. It's a Simplex photomicrograph showing "treeing" effect that results when a 15 KV polyethylene-insulated cable is broken down by 100,000 volts. This is typical of the continuing research work done at Simplex.

If you are interested in the important facts that Simplex scientists Kitchin and Pratt have discovered on polyethylene treeing, write for their AIEE Paper No. 58-121.

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Electrical Construction and Maintenance

57th Year MARCH • 1958

Centralized Control

Among the outstanding electrical features appearing in some of the new commercial buildings recently completed or under construction is a control center from which all parts of the mechanical and electrical facilities can be operated and monitored.

A study of the riser diagram of any modern large commercial building will disclose an increasing array of motor operated equipments dispersed throughout the building. If only local controls are provided, the task of starting up, shutting down and other operations which must follow the daily program becomes a fairly complicated and time-consuming job.

More important, with the increasing mechanization of our buildings, is the need for convenient and continuous monitoring of the various services. As heating, cooling and ventilating systems become more automatic they require less attention under normal operating conditions. However, they are just as subject to component mal-functions, if not more so, than manually operated systems. So means must be provided to give operating personnel a complete check on the systems at all times.

The trend toward switching lighting systems by areas or entire floors with contactors has also made central lighting control convenient and feasible. The local control and pilot circuits are extended to the central control panel permitting the lights in all areas of the building to be controlled in accordance with the building program.

Typical central controls provide remote operation of heating equipment, air conditioning, fans, pumps, valves, motor-stairs, water coolers, emergency lighting, signs and, as noted above, complete lighting systems. They also provide duplicate instrumentation of important information such as boiler pressure and water temperature. Air temperature readings from a number of areas in the building can be monitored. Alarm signals and annunciators are also located here.

A further refinement, and a logical one, is just beginning to appear. This is the central program system. An automatic program device takes over the routine switching, freeing the operators for monitoring and manual intervention to meet special circumstances.

Wm. T. Stuart



Connecting the leads for a motor control panel, resetting a reconditioned drive motor, or running in some new bench outlets for power driven hand tools give you perfect opportunities to benefit by Graybar service. Your nearest Graybar warehouse has — ready for prompt delivery — the right product for every wiring need.

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Electrical
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Residential Wiring Ideas

A roundup of practical wiring layout and design practice from current construction plans of modern electric homes.

CONTEMPORARY electrical wiring practice in residential construction is making substantial progress in the crucial aspects of total system capacity and full capacity availability in areas of heavy utilization. Service entrance conductors and equipment of 100-amp capacity and larger have gained wide acceptance in the industry. Individual circuits to major appliances are providing full power for optimum performance, and as many as three and four appliance circuits in kitchen, laundry and dining areas are opening up electrical systems for convenient and simultaneous use of modern portable appliances.

The vigorous growth in the use of built-in lighting fixtures, as well as a renewed public interest in high-quality traditional lighting fixtures, is having a pronounced effect on wiring layout and, particularly, switching practice.

In addition to door signals, the electrical installation now often includes a sound, intercommunication system and a television antenna distribution system.

Service Entrances

The most important recent influence on service entrance design has developed from the growing popularity of central air conditioning. Installations involving three and sometimes more individual room coolers, have also increased capacity requirements.

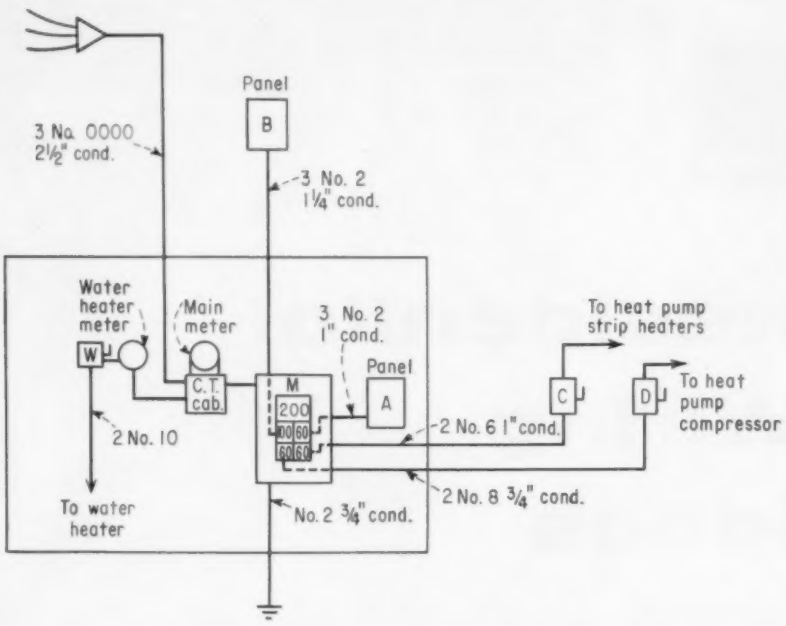
Whereas typical 100-amp services are usually adequate for homes with conventional electric kitchen and laundry facilities, the continuous load of air conditioning requires substantial additional capacity. The 150-amp service appears to be emerging as a minimum where 3 to 5 hp of air conditioning is to be served.

The accepted method for calculating the minimum size of service entrance conductors is provided by Article 220 of the National Electrical Code. For homes under 3000 sq ft with conventional electric cooking and laundry appliances, it will usually be found that the code calculations, if air conditioning and water heating are excluded, will call for minimum capacity of somewhat less than 100 amps.

Thus, if the water heating load at 100% and central air conditioning load at 125% are added to 100 amps, the resulting minimum service conductor capacity will usually satisfy the code requirements. Where both electric heating and cooling are installed, the larger of the alternate loads is used in determining the service entrance conductor capacity.

For high-capacity service conductors, the present trend is toward the use of RH or equivalent insulations to gain the additional capacities permitted in code Table 1, column 3. The advantages are especially significant from No. 3 upward.

Service entrance equipment is



Symbol	DESCRIPTION
M	Main Distribution Panel -200 amp 3-pole, S.N. 2 fuse Main Disconnect -1-100 amp 2 pole -3- 60 amp 2 pole
A	Panel "A" 8 - 15 amp S. P. 2 - 20 amp S. P. 1 - 30 amp 2 P.
B	Panel "B" 10 - 15 amp S. P. 4 - 20 amp S. P. 2 - 30 amp 2 P. 1 - 40 amp 2 P.
C	Heat pump switch - 60 amp 2-pole, 2 fuse
D	Heat pump switch - 60 amp 2-pole, 2-fuse
W	Water heater switch 30 amp, 2-pole, 2 fuse

RISER DIAGRAM of a home equipped for all-electric services. Separate circuits serve the heat pump-air conditioner and its auxiliary resistance heating coils. Lighting and appliances are served by two separate distribution panels.

usually located in the attached garage or in the utility room. Branch circuit distribution is usually incorporated in the same enclosure; however, in some larger homes feeders are extended to separate branch circuit panels in other areas of the house.

Branch circuit practice is moving rapidly toward providing full-circuit special-purpose outlets for all major appliances and two or more appliance circuits for portables. As a result, distribution assemblies often include up to six mains or 240-volt branch circuits and 20 or more 120-volt branch circuits.

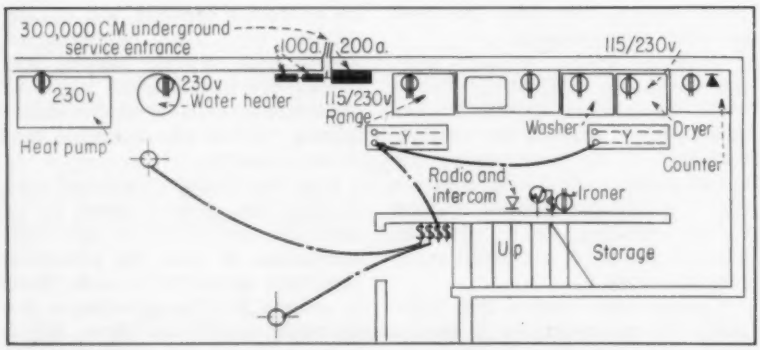
The traditional appliance circuit required by the code is now appearing as a 3-wire circuit with one or more additional circuits feeding outlets in the kitchen counter area. The rapid increase in the use of independent portable cooking appliances—broilers, rotisseries, fry pans, deep fryers, sauce pans, toasters, roasters, coffee-makers, egg cookers and grills—as well as other electrically operated kitchen aids—are requiring 3- to 4-circuit capability for full utilization of these convenient and popular devices.

The trend toward built-in cooking components instead of the conventional range is also reflected in wiring practice. Typical installations involve a four-burner range top built into the counter top with one or two separate built-in ovens at other locations in the kitchen. Each unit is wired on its own 240-volt circuit. Ovens usually take No. 10's and surface cooking units No. 10 or 12, depending upon their nameplate ratings. The built-ins are usually direct-connected with the cable looped to allow removal of the unit from its framing.

Built-in dishwashers and disposal units are both served by a special purpose circuit and are usually direct-connected.

In current practice, the following appliances and equipment are each served by an individual special-purpose circuit which serves no other outlets:

- Electric range
- Electric range top (built-in)
- Electric oven (built-in)
- Clothes dryer
- Washing machine
- Ironer
- Dishwasher (and disposal unit)



LAUNDRY and utility area plan of an all-electric home showing location of service and major appliances.

Central air conditioner
Room air conditioners
Attic fan
Water heater
Bathroom heater
Refrigerator-freezer
Heating plant
Sump pump
Hobby bench

Electric heating, either full or supplementary, is served by special circuits specially designed and installed for the equipment layout.

Central Air Conditioning

Typical sizes of central air conditioning plants for residences are 3 and 5 tons of refrigeration capacity. The electrical load consists of the compressor and the fans which move air through the cooling and condenser coils. Horsepower ratings are sometimes nominal so that for circuit design the full load current rating, which is given on the equipment, should be observed.

The air conditioner is usually served by one of the mains in the service entrance panel. Typical values of fuses or circuit breakers are given in the load and circuit chart.

Air conditioning loads are continuous over long duty cycles so the conductors of the branch circuit must be rated at not less than 125% of the full load curent of the equipment. Typical conductor sizes are No. 8's and No. 6's.

Heat Pumps

Connections and circuits for a heat pump installation are the same as for a central air conditioning plant. Heat pumps are essentially air conditioners with devices capable of switching the air flow so that the evaporator or cooling coil chills the outside air and the condenser or heating coil heats the inside air. Heat pumps are a highly efficient and economical source of heat. At low outside temperature, however, the temperature of the condenser drops off and, consequently, heat pumps are often aided by resistance heating elements.

Where supplementary resistance heating units are installed in the heat pump enclosure, they are served by a separate branch circuit from the service entrance panel. Typical values of fuses or circuit breakers are 50 to 100 amps with

Load and Circuit Values for Special-purpose circuits

Appliance	Typical Wattage	Circuit Conductors	Voltage	Circuit Protection	Note
Range	10,800	No. 6	120/240	50-amp 2p	
Oven (built-in)	4,500	No. 10	240	30-amp 2p	
Range top (2 unit)	3,000	No. 12	120/240	20-amp 2p	
Range top (4 unit)	6,000	No. 10	120/240	30-amp 2p	
Dishwasher	1,200	No. 12	120	20-amp 1p	
Refrigerator-freezer	600	No. 12	120	20-amp 1p	1
Dryer	5,000	No. 10	120/240	30-amp 2p	
Washer-dryer	5,000	No. 10	120/240	30-amp 2p	
Washer	1,200	No. 12	120	20-amp 1p	2
Ironer	1,600	No. 12	120	20-amp 1p	2
Water heater	3,000	No. 10	240	20-amp 2p	3
Air cond. ¾ hp	1,000	No. 12	120	20-amp 1p	
Air cond. 1½ hp	2,300	No. 12	240	20-amp 2p	
Air cond. (central)					
5 hp	6,500	No. 6	120/240	70-amp 2p	4
3 hp	4,000	No. 8	120/240	50-amp 2p	4
Heat pump					
5 hp	6,500	No. 6	120/240	70-amp 2p	4
Supplementary	10,000	No. 6	240	50-amp 2p	5
Heating plant	500	No. 12	120	20-amp 1p	6
Attic fan ½ hp	800	No. 12	120	20-amp 1p	
Water pump 1 hp	1,500	No. 12	240	20-amp 2p	
Sump pump	500	No. 12	120	20-amp 1p	
Bathroom heater	1,500	No. 12	120	20-amp 1p	
Electric space heat	15,000	(as required)			7

The above loads are representative of those which require individual circuits, or which are preferably served by individual circuits as explained by the following notes:

Note 1. Refrigerators and freezers may be served by outlets on an appliance circuit. It is recommended, however, that these appliances be served by a separate circuit with no other outlets. The purpose of this recommendation is to eliminate the probability of interrupting the operation of these appliances as a result of connecting faulty cords or portable appliances to the same circuit.

Note 2. The automatic washer or the ironer may be served by an outlet on an appliance circuit. Separate circuits are recommended, however, because at portions of the operating cycle such equipment often takes 50% or more of the full circuit capacity.

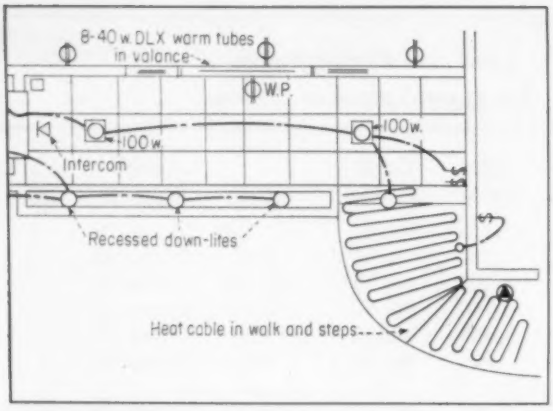
Note 3. Water heaters involving off-peak rates involve special circuits. Consult the utility for connections.

Note 4. Central air conditioning load and circuit requirements vary with the size and capacity of the plant. Typical residential plants are rated at 3 and 5 hp in compressor load and ½ hp in fan load. Wiring should be installed in accordance with the manufacturer's specifications.

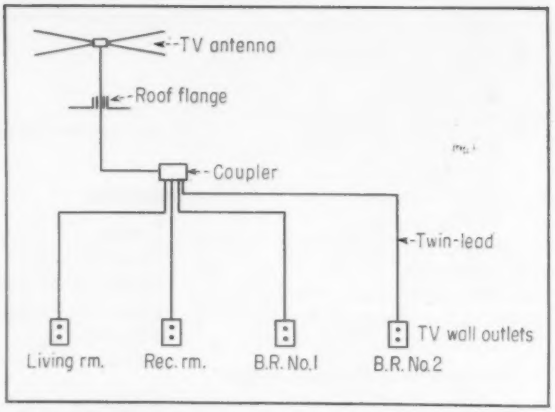
Note 5. Heat pump load and circuit requirements vary with the size and capacity of the plant. Typical residential plants are rated at 3, 5 and 7½ hp in compressor load, ½ hp in fan load plus, in some instances, supplementary resistance heating. Wiring should be installed in accordance with the manufacturer's specifications.

Note 6. Many local ordinances require a separate circuit for the oil burner or heating plant. It is also advisable for the reasons given in Note 1 above.

Note 7. Electric heating load and circuit requirements vary with the heating design requirements. Fixed electric space heaters are conventionally connected on 240-volt, No. 12 or No. 10 branch circuits. The connected load should not exceed 80% of circuit capacity.



ENTRY DETAIL showing heating cable in walk and steps, recessed lighting and intercom speaker at door.



TV ANTENNA system diagram showing the components and hook-up of a four outlet distribution system.

conductors of No. 6 to No. 2. As with the air conditioning load, it is important to provide not less than 125% of the load rating in conductor capacity since the heating load is continuous on relatively long duty cycles.

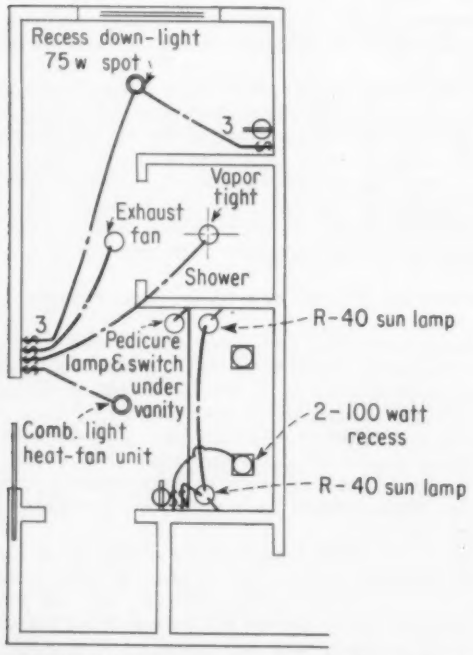
Communication

Sound intercommunication systems are featured in many new homes. Typical systems use a master control station located in the kitchen with remote stations at the entrance doors and throughout the house. In conventional use, such systems permit "answering" the doorbell, arousing the children in the morning, listening-in on the nursery and a variety of other conveniences from the master station location or, depending on the circuits employed, from other locations.

Flush-mounted intercommunication equipment is installed in special wall boxes provided with the equipment and wired with cables in accordance with the manufacturer's instructions. Boxes are installed and wiring roughed in at the same time as the power wiring is installed.

An increasing number of homes are now being wired for television during construction. The antenna is roof-mounted or installed in the attic space. A coupling device distributes the antenna signal over twin-lead conductors concealed in the walls to flush outlets in the living room, recreation room and bed rooms.

Multiple outlet television antenna distribution systems are available to electrical contractors in "package" forms in which all of the parts and components for a single home are provided in a kit ready for installation.



BATHROOM DETAIL shows sun lamp installation and heat-fan-light combination unit in ceiling.

Typical Residential Heating Panel Schedule

Total connected load	18 kw	
Heating main	100 amps 2 p	
Heating main feeder	No. 2	
Heating panelboard	8 2-p, 240-v, 20-amp circuits	
Branch circuits	No. 12	
Cir. 1 Living room—dining room		3500 w
Cir. 2 Living room—dining room		2500 w
Cir. 3 Family room		4000 w
Cir. 4 Kitchen—laundry—utility		1200 w
Cir. 5 Bedroom No. 1		2600 w
Cir. 6 Bedroom No. 2		1500 w
Cir. 7 Bedroom No. 3		1500 w
Cir. 8 Bath 1, 2		1200 w

Improved Lighting Techniques Feature

Modern Residential Lighting Design

BUILT-IN and architectural lighting techniques are being used to light more and more areas in today's modern homes. This activity is increasing in tempo, and is helping to establish new standards for residential lighting. This trend was strongly reflected in the residential lighting entries of the 1957 International Lighting Competition. For that reason, these competition entries have been used as a source for the lighting design ideas presented here. The ideas have not been limited to the prize winning entries, but have been selected at random from all the entries to show a wide variety and range of lighting techniques. All of these techniques are thus practical ideas already installed and in use.

A significant factor which emerges from today's home lighting trends is the installation and use of lighting techniques which will provide two types of lighting effects. One is a low level of general illumination of fairly uniform intensity throughout an area, such as in the living room or dining area. This lighting serves as utility lighting for general movement about the area, or from one room to another, and as a background for more specific lighting treatments. The other is the provision of higher levels of illumination over a limited area, for maximum ease of seeing for the various activities, such as reading, sewing, playing cards, writing, studying, playing the piano, eating, etc. Examples of these two types of lighting are given in the following case studies.

Light has two primary functions in the home, which is being realized and accepted more and more by lighting specialists, architects, builders and home owners. One is utility—providing light to see by. The other is art—providing light for decoration.

Light to see by should be of the proper quantity and quality for maximum seeing comfort, depending on the degree of severity of the seeing task. For conversation a low level of ambient light throughout the room is usually desirable. But for reading, or writing, or other similar visual tasks, a high level of illumination is desirable. Lighting techniques should be used to provide either type of lighting with a minimum of direct or reflected glare. Also, brightness ratios within the area should be kept low.

Light for decoration consists of highlights and shadow effects, created through the use of light sources of varying colors, intensities, and types of light distribution, combined in such manner as to feature the lighting effect, and not the lighting units or lighting equipment. The light itself should form the decorative touch, in combination with surface textures, colors and shapes, and the lighting units should be completely concealed from view, or made as unobtrusive as possible. Lighting flexibility, through switch control and circuit dimming, is desirable in providing light for decoration, so that a maximum variety and range of lighting effects may be had from a minimum of lighting units and lighting equipment. Highly ornamental luminaires, per se, are not generally used to provide light for seeing, or for utilitarian purposes, and their use as decorative ornaments is on the decline except for good period design or fine crystal luminaires.

Living Family Area

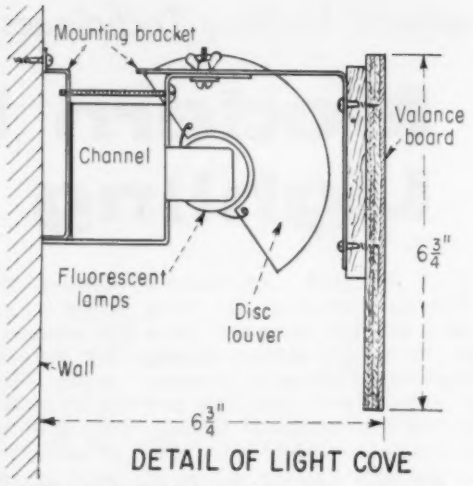
PENDANT LUMINAIRES conceal reflector lamps which highlight draperies at picture window, while adjustable ceiling brackets house similar lamps to highlight wall on opposite side of room. Table lamp is centered in front of window at end of room. A fluorescent lamp is recessed in mantel below diffusing glass panel to light picture over mantel.



BECAUSE of the wide range of activities carried on in the average living room, or family room, lighting for this area should be as flexible as possible. Intensities should be available ranging from a low glow to a high level, for reading, writing, sewing, etc. with comfort and ease. Low level illumination should be provided throughout the room, and high intensities should be available in all areas where it may be required.

Several lighting techniques are available to meet these lighting requirements, some of which are shown in the accompanying illustrations. Multiple lamps units, or units using two-filament lamps, may be switch controlled to provide dif-





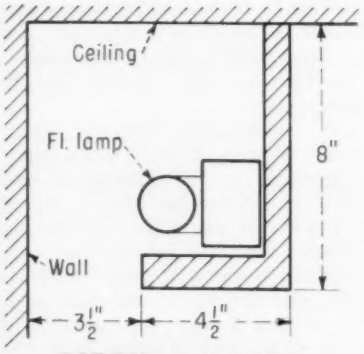
DETAIL OF LIGHT COVE

VALANCE board shields lamp from room area, and a disc louver on lamp shields it from view along the wall.

LIGHT COVE on wall provides indirect illumination and washes entire wall with light. Supplementary illumination for localized lighting is provided by table lamp (right) and floor lamp at end of room (left).



WALLS of this living room, drapery covered, are washed with light from deluxe warm fluorescent lamps in a cornice. Effect is similar to that from a reverse cove. Cornice forms an architectural element of the structural construction. Note the uniform low level diffuse lighting throughout the area.



BOTTOM SHIELDED CORNICE

CORNICE LIGHTING consists of T12 fluorescent lamps on wiring strip concealed behind a structural member finished white on inside, same color as wall on outside.

ferent levels of illumination. Also, dimmers may be used on all types of lighting units, to provide a full range of intensities from black-out to full intensity.

The modern trend in lighting the living area is to eliminate the typical center ceiling outlet, and to use valance, wall and cornice lighting units to provide a general low level of illumination throughout the room. Large area luminous panels, including full ceiling areas, are also coming into use. And a new trend in lower-priced homes is to use four outlets in the ceiling of the living area (or six outlets, if the area is exceptionally large), one in each corner of the room. This technique permits the use of ceiling-installed pendant luminaires, such as the pull-down type, and places these units where they are most suitable for the usual furniture arrangements. When this technique is used, outlets are usually located in the corner area 27 in. out from each wall. When furniture arrangement is such that luminaires are not suitable in each corner, the outlet is merely capped.

It is also not only possible, but desirable, to recess reflector-type units in the ceiling in these corner locations to provide high level light for performing critical seeing tasks.



RECESSED incandescent units light the dining area in this home. The dining area is open to the living room and is a part of the living area. A pinhole spotlight accents the dining table, while recessed units near the wall provide general illumination. Pull-down type ceiling unit provides light at sofa for reading, helps divide the dining area from the living room proper.



LOCAL LIGHTING over table in this formal dining room is from a direct-indirect pull down type pendant. Draperies at windows are lighted by recessed incandescent down lights, and wall cabinet is lighted by adjustable type recessed ceiling floodlight.



VALANCE lighting at large window uses deluxe warm fluorescent lamps and provides general illumination. A six-light pendant luminaire provides both direct and indirect light over the table, adds sparkle to the area.

Dining Area

LIGHTING requirements for the dining area are normally general diffuse lighting supplemented by accent lighting for the table. Techniques used should conform and harmonize with the lighting in the living room, especially when the two areas are adjacent or open to each other.

A wide variety of lighting treatments are available and suitable for the dining area. Cove and valance, or cornice lighting, and indirect wall brackets, are excellent for providing a general low level of diffuse lighting. Accent lighting over the table may be accomplished by an appropriate pendant luminaire suspended over the table, or by recessed and built-in types of units in the ceiling. Illuminated wall cabinets, niches, paintings and murals in the dining area add a touch of warmth and sparkle, and are desirable from a decorative standpoint.



LUMINOUS CEILING lights this kitchen and dining nook. Intensity is 75 footcandles in kitchen, 50 footcandles in dining area. Ovens (right) are illuminated by a ceiling-recessed eyeball floodlight (R40 lamp), and ventilating hood also contains R-40 flood lamp (not visible in photo). Incandescents also flood planter in window.

Kitchen Area

THE primary function of light in the kitchen is utilitarian. Thus it is desirable to use lighting equipment which is efficient, and produces as much light as possible of the correct light distribution pattern and color quality at the points where most needed. For these reasons the trend is toward the use of standard commercial type lighting units. It is also easy to select units which conform to the structural details of the area, and are attractive in appearance. Units with smooth contours and straight lines are usually preferred.

Two types of lighting are called for in the average kitchen—a general level of illumination of 25 to 75 footcandles, and higher, and specific lighting of higher levels of illumination of 50 to 150 footcandles for local work areas. Recessed or surface-mounted ceiling units with diffuse lighting characteristics are preferred for providing the general lighting throughout the kitchen area. Local lighting is usually accomplished by using special type units which proved the maximum light where needed with asymmetric light patterns to conform to the area being lighted. One such area is the sink, where an elongated pattern of light is needed. Another is over work areas located under wall cabinets, where continuous reflectors solve the problem efficiently. Ceiling recessed or surface-mounted floodlights over center table work areas is another typical area and solution.



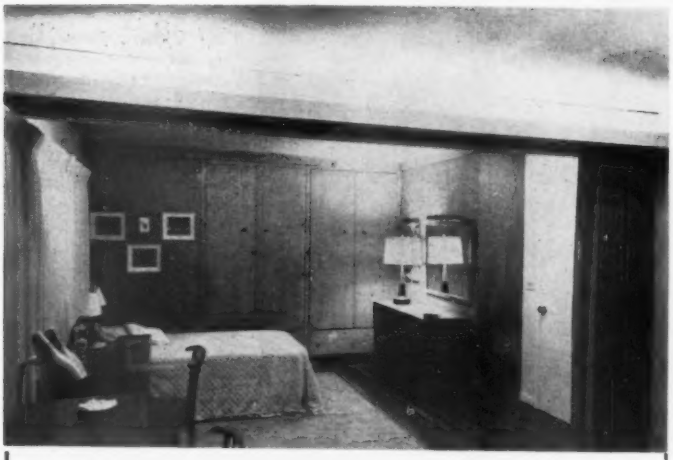
SMALL KITCHEN uses surface-mounted ceiling unit housing two circline fluorescent lamps in plastic diffuser to provide general lighting. A tubular reflector unit under cabinet lights work area, and an asymmetric type louvered reflector recessed in soffit above window lights sink area. Breakfast area (left) is lighted by a ceiling mounted incandescent unit.

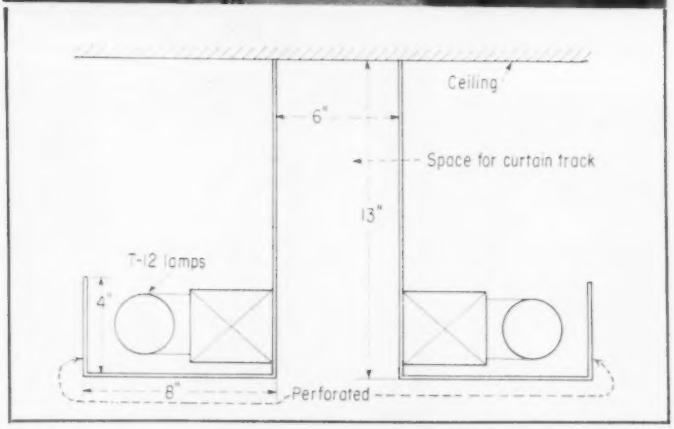


CONTINUOUS line of tubular lamps under cabinets provide an abundance of shadowless and glare-free light on all work areas, while shallow luminaires surface-mounted on ceiling provide general illumination throughout this modern and attractive kitchen. Warm white or deluxe type fluorescent lamps are preferred for lighting the kitchen.



VALANCE LIGHTING projects a flood of light down over the draperies in this bed room, while two pull-down type incandescent pendant units, one at the head of each bed, provides an abundance of light for reading in bed. Table lamps (not shown) will light the mirrors.





COVE LIGHTING provides the general illumination for two adjacent bed room areas, and conceals curtain track which makes it possible to close off one room from the other. Special pierced metal cove is located across ceiling at midpoint of two-room area, and T12 fluorescent lamps in each cove light the room. Incandescent desk and table lamps provide specific lighting for study, mirror makeup, etc.

Bed Rooms

BED ROOMS which are well lighted are popular rooms in the home, while those that have poor lighting are less popular. Plenty of illumination, with flexibility to provide a wide range of lighting intensities and decorative effects, automatically increases the use of a bedroom, and makes it much more livable.

Lighting requirements are for general illumination throughout the entire room, and for specific lighting for other visual tasks such as reading, sewing, mirrior lighting for makeup, full length mirror lighting, and for an attractive and appealing decorative atmosphere. General illumination can be provided by the well-known center outlet ceiling luminaire, or by the newer technique of valance, cornice, or cove lighting. Light for reading, sewing, etc. can be provided effectively and efficiently by suspended or built-in ceiling units preferably, or by floor and table lamps if the home owners prefer them. Mirror lighting is best accomplished by large area low brightness panels located on either side of the mirrors, to direct their diffused illumination outward to light the person, which makes his image easy to see in the mirror.



TROFFER units equipped with cool white deluxe fluorescent lamps and plastic diffusers are recessed in soffit of this bathroom, and provide high level of well diffused illumination of excellent color quality to aid in ladies' makeup.

Bathrooms

THE seeing problems in the bathroom are both casual and critical. There is need for a low level of general illumination. This can be provided easily with a ceiling unit which has a diffuse symmetrical light distribution, and in small bathrooms is often solved by using the spill light from the special application units.

Special lighting is needed at the bathroom mirror, in that the units should be located where they will direct light onto the person whose reflection is to be seen. The surface brightness of these units should be kept low, to prevent direct glare. In order to get a suitable intensity of light on the person, and still not produce glare, the surface area of the units should therefore be fairly large. Usual practice is to install two long tubular brackets, centered at the mirror, one on each side.

Bathrooms with shower stalls should be lighted with a diffuse type ceiling unit, to provide a low level of illumination in the area. Large bathrooms should also have a ceiling unit located over the tub. Vaportight incandescent units are appropriate for this location.

Every bathroom should also have a sunlamp located appropriately for maximum utilization of its radiation, depending upon the size and shape of the bathroom. Many home owners also want a night light recessed in the bathroom wall which is kept burning continuously.

Luminous ceiling and large-area low-brightness units are being recommended and used for lighting modern bathrooms. When mirrors are to be used for makeup, deluxe fluorescent lamps are recommended.



DIFFUSED general lighting in this bathroom is from a cornice installed along the top of the long wall mirror. Three recessed ceiling units over the tub-shower contain two type RS sunlamp bulbs and one infrared heat lamp.



DIFFUSING PANELS in recessed wall units on each side of mirror, and in soffit above mirror, provide ideal light for mirror. This lighting is further supplemented with adjustable wall brackets containing reflector lamps, and may also be equipped with sun lamp bulbs if desired.



FRONT of this residence is flooded with light from 75-watt R-30 lamps recessed in soffit of eaves, and recessed dome light in main entry. Decorative post lantern is located in center of circular drive, and louvered garden lights are located on outer perimeter of drive. During holiday seasons, suitable colored lamps are substituted in these units to provide festive and colorful appearance.

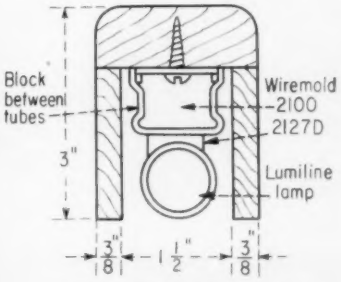
Outdoor Lighting

OUTDOOR lighting serves a dual function for the home. It provides illumination for utility, safety and protection, and it serves as an artistic adjunct to the outdoor area of the home. It may be planned with major emphasis on one or the other of these two functions.

Minimum requirements for safety and convenience are for an outdoor light at each entrance to the house and over the garage door. This may be provided by any of a number of devices, or lighting techniques, of which the post top lantern, the wall bracket unit, or a floodlight recessed in the eaves or portico ceiling are the most popular for use. Illuminated house numbers are also a courtesy for visitors and tradesmen. Step lights help prevent falls and accidents, also add a new note of decoration. More and more homes are also providing floodlighting which lights the entire perimeter of the house, as a measure of protection against prowlers.

Using light for decoration is limited generally only by the amount of money available for this purpose and the ingenuity and imagination of the lighting specialist and owners in adapting light, both white and colored, to provide an artistic and attractive appearance of the yard, grounds and gardens at night. Such lighting usually provides light for safety, protection, and easy movement in and out of the house automatically, as well as serving as a decorative feature.





STAIR RAIL DETAIL

GLASS FACADE allows light from living-dining area to flood steps and yard with light when draperies are pulled back. Steps are lighted separately by lumiline lamps recessed in bottom of handrail. Note illuminated house number at eye level on wall. Detail of handrail light is shown above.



RECESSED units in eave overhangs project an abundance of light downward and flood the outdoor patio area, while ground-spike luminaires provide lighted areas on the lawn, add an interesting pattern of highlights and shadows.

DIVISION

Architect/Engineer

CLASSIFICATION

Residential Lighting

AWARD

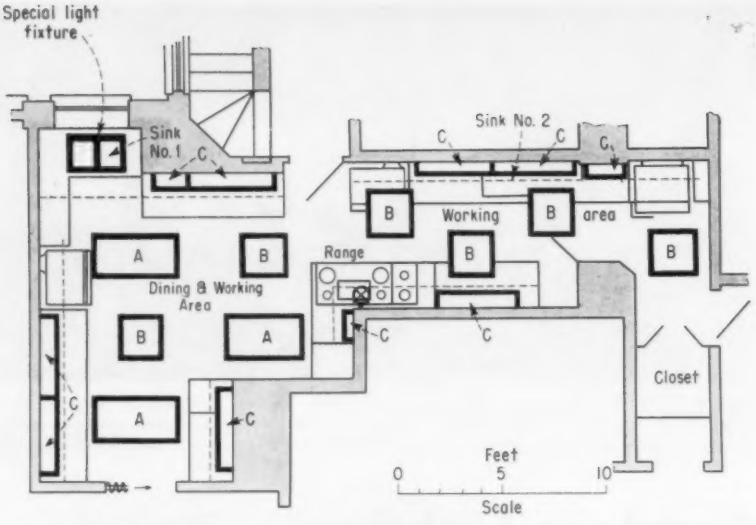
First Prize

PROJECT

Architect's Remodeled Kitchen

WINNER

Melvin Cohen
A. Epstein & Sons, Inc.
Chicago, Ill.



REMODELED KITCHEN in home of a Chicago architect contains 230 sq ft, is lighted to intensity of 57 footcandles by 1800 watts in recessed fluorescent luminaires.

INTERNATIONAL LIGHTING COMPETITION 1957

Built-In Luminaires Provide

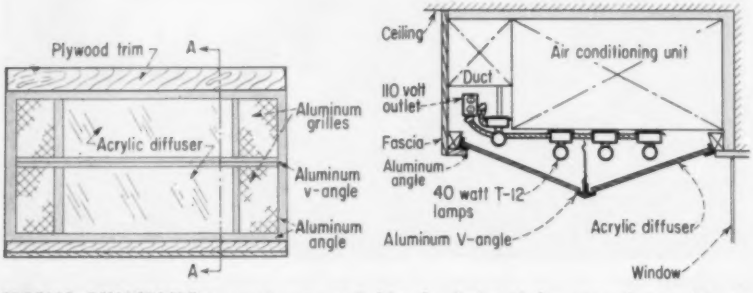
Light for

LIGHTING that is ingeniously integrated with architectural design features the renovated and modernized kitchen of a Chicago architect. The lighting system was planned and specified by an illuminating engineer who is a member of the owner's architectural and engineering firm, who was given a free hand and full cooperation in the entire wiring and lighting design. Only the structural details of the old kitchen, and the owner's selection of a color scheme, were faced as problems to be met and solved from the lighting viewpoint.

The remodeled kitchen (see plan) is of irregular shape, embracing the combination of the old kitchen, butler's pantry, and pantry closet. The ceiling is an acoustical metal pan painted light blue (reflectance 40%). Cabinets are a wood grain laminated plastic (30%). Walls below cabinets are white ceramic tile (70%), while countertops are white laminated plastic (70%) and wood block (25%), and floor is yellow asphalt tile (50%).

The new metal pan ceiling was placed on the underside of the old plaster ceiling at a height of 9 ft from the floor. The old ceiling was, in turn, suspended from a concrete slab. A recessing depth of 11 in. between the new metal pan ceiling and the concrete slab resulted, except where there were concrete beams which were on approximately 4-ft centers.

Taking these problems into account, ceiling luminaires were selected having a dropped acrylic plastic diffuser to provide general illumination. Troffer-type units (Type B—Wakefield Betaplex TT-424-1) 24-in. square were used in the kitchen work area, and installed in a staggered pattern to miss the concrete beams. The dropped diffusers provide light on the ceiling, and maintain a satisfactory brightness contrast between the luminaires and the pale blue ceiling. In addition, these units with their direct type light distribution provide a highly efficient system for the existing conditions of a low reflectance ceiling and a high reflectance floor. The staggered layout of units gives an illusion of increased width in the 5-ft wide working area of the kitchen. By extending the staggered layout into the adjoining dining and working area, and combining 24-in. square and 2-ft by 4-ft rectangular units of the same type (Type A—Wake-



SPECIAL LUMINAIRE is used over sink No. 1, designed for easy disassembly to permit ready access to air conditioning unit. Warm white lamps are used.



RECESSED LUMINAIRES in ceiling are wired for two-circuit control to provide general lighting flexibility, and two intensity levels. Diffusers are acrylic plastic.



DIFFUSED illumination prevails at sink No. 1 from special V-shaped luminaire.

Modernized Kitchen

field Betaplex No. TF-448-1), the two areas are united in design and appearance.

One area presented a special problem from the lighting standpoint. This was the sink by the only window in the kitchen. An air conditioning unit was to be placed over this sink, and it was necessary for all parts of this unit to be readily accessible for maintenance. This precluded the use of any permanent type unit on the underside of the air conditioning unit, the logical location for a luminaire to provide supplementary lighting over the sink area as called for by good lighting practice.

To solve this problem, a special luminaire was designed for this location, with features which permit it to be disassembled and reassembled easily without tools so that all parts of the air conditioning unit are readily accessible. It is V-shaped in design, with two flat acrylic plastic diffusers supported on aluminum angles (Luminous Ceilings, Inc. special). Inside this unit are four wireway channels for four 40-watt fluorescent lamps which snap into fixture mounting brackets and are easily removable.

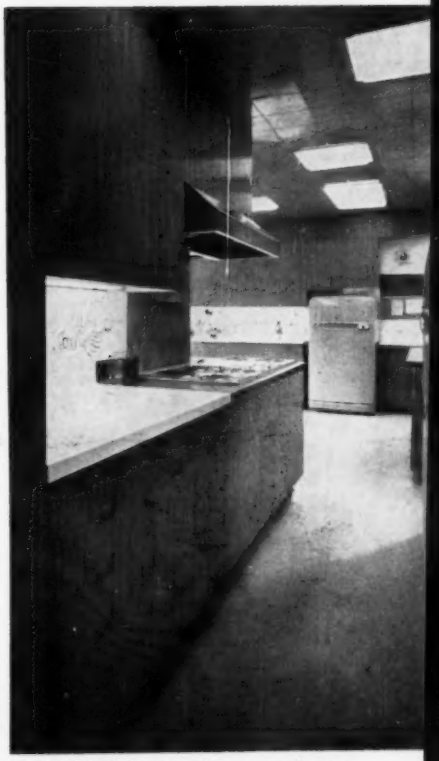
All ceiling luminaires are wired for two-circuit control, so that full intensity or half intensity can be selected as desired.

Supplementary lighting is provided on all countertops and work areas under cabinets (Type C—Alkco No. 340TS and No. 320TS). Units are triangular shaped fluorescent brackets with Albalite glass diffusers, using 40-watt T12/RS lamps or 20-watt T12 lamps with trigger-start ballasts, as required by dimensions.

Warm white fluorescent lamps are used throughout, because this color adds warmth to the decorative treatment, and complements the complexion of members of the family.

The illumination, after one year's use, was 65 fc average in the dining and working area, and 35 fc in the kitchen working area. Intensities on work counters ranged upwards from 70 to 110 fc under cabinets.

This lighting installation was designed in the office of A. Epstein & Sons, Inc., in Chicago, by Melvin Cohen, illuminating engineer for this architectural and engineering firm.

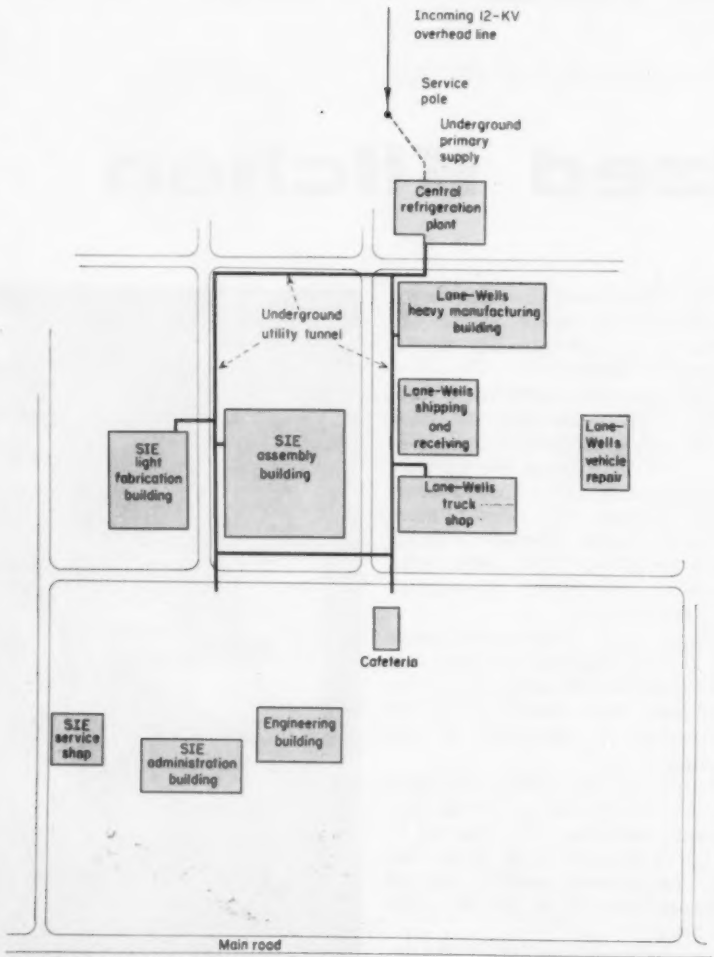


SUPPLEMENTARY and general illumination are provided for kitchen working area.

Primary radial system backs . . .

Distribution In A

A modern high-capacity electrical system for the multi-building plant of Southwestern Industrial Electronics Company, Houston, Texas, one of the Dresser Industries, uses a load center layout fed by high-voltage interlocked armor cable in an underground tunnel. Here's a close-up on design and construction details.



PLOT PLAN of the S.I.E. plant shows basic layout of buildings which have been designed. At present, construction is underway on the central refrigeration plant, fabrication and assembly buildings, manufacturing and truck buildings and the service shop. Utility tunnel serves the buildings as shown. Buildings not supplied by the tunnel will be supplied from substations in the other buildings or from extensions of the tunnel feeders.

AN UNUSUAL distribution layout is the hard backbone of a modern electrical system at the new Southwestern Industrial Electronics plant in Houston, Texas. Here, high voltage feeders are carried radially from a central facilities building to load-center substations in the individual industrial buildings. Inside electrification of the buildings also represents interesting design features. A step-by-step study of the overall electrical job reveals various engineering highlights and demonstrates the construction know-how of the Howard P. Foley Company, electrical contractors on the project.

When completed, the Southwestern Industrial Electronics plant will consist of 11 buildings, totaling 280,000 sq ft of floor space. SIE designs and manufactures electronic and electromechanical instrumentation used in modern seismography and geophysical exploration, industrial instruments such as resistance meters, voltmeters, oscillators, amplifiers, comparison bridges and computers and other control equipment for complex closed loop control systems. Dresser Industries, Inc., is the parent company of SIE and other companies that produce equipment for the oil, gas and chemical industries.

Construction of the SIE plant is currently underway. The overall project has been divided into several stages. The story here and the accompanying illustrations cover design and construction details on the first stage of the job. On the plot plan shown, this includes the

Multi-Building Plant

By **Weldon W. Henderson,** *Associate*
Bernard Johnson & Associates, Consulting Engineers
Houston, Texas

central refrigeration plant, fabrication and assembly, heavy manufacturing and truck shop and vehicle repair buildings.

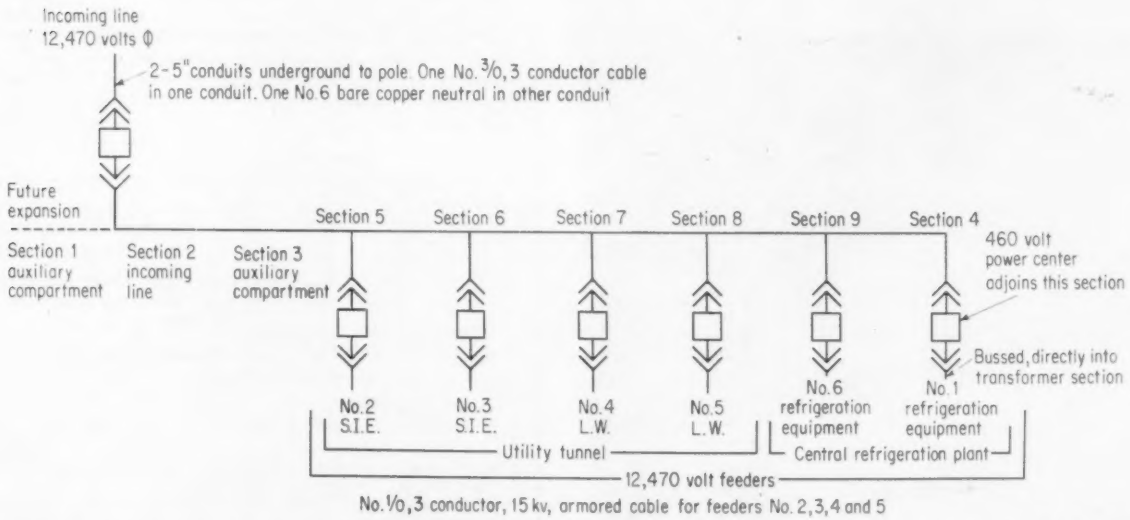
Electric energy supply to the premises is made by an overhead 12-kv line to a service pole behind the central refrigeration plant. From this pole, the incoming supply conductors are carried underground, in concrete-encased ducts, into primary switchgear in the refrigeration plant. Distribution is then made to load-center substations in the various buildings as shown in the plot plan and the high voltage single-line diagram.

Feeders from the central refrigeration plant to substations in the other buildings are interlocked armored cable carried on cable racks from the primary switchgear down into the utility tunnel and out to the buildings. This tunnel provides passage for heating and air conditioning pipes, in addition to the electrical feeders. All of these facilities are supplied from the central refrigeration plant.

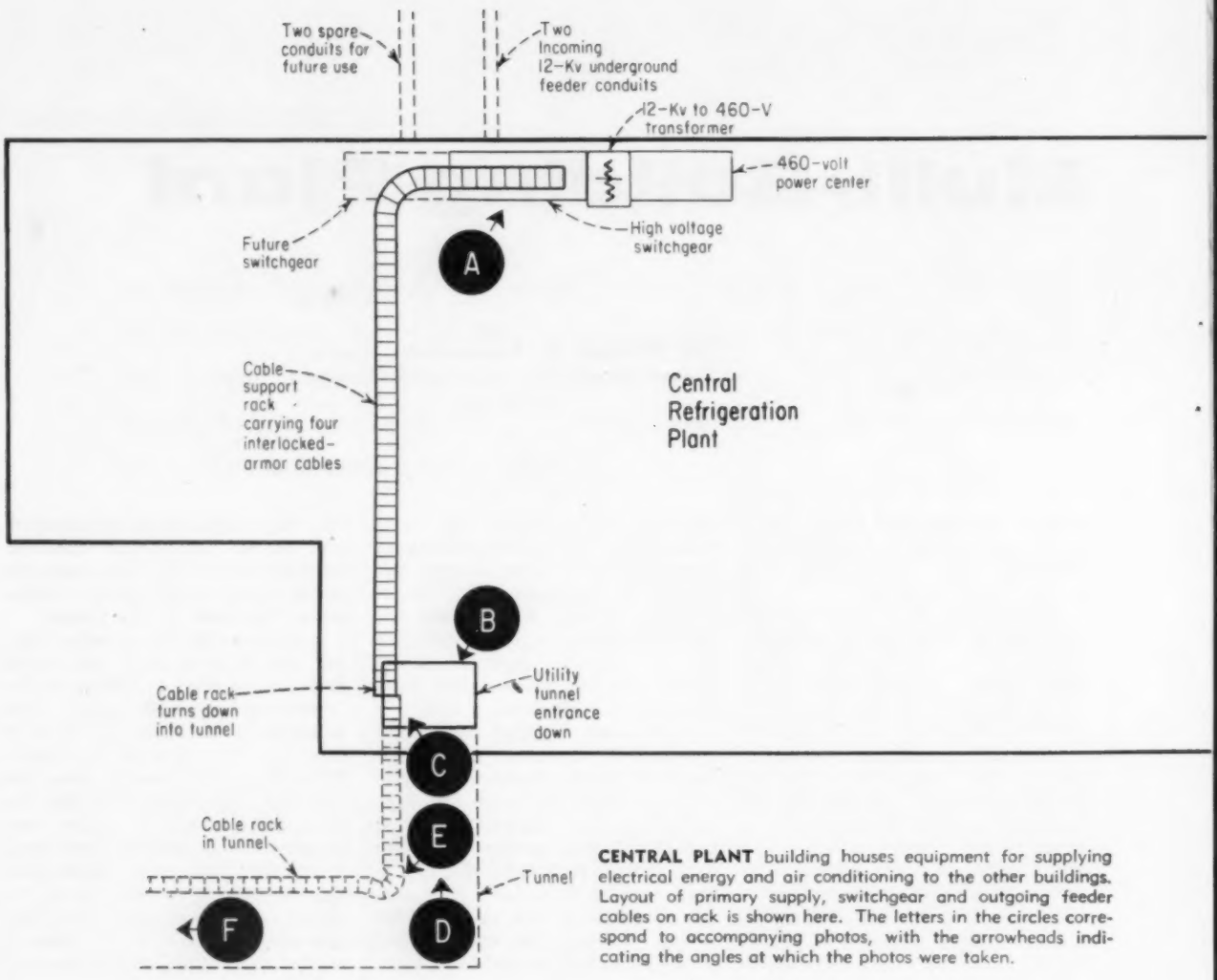
In this case, the final selection of interlocked armored cable was based on careful study of the possible ways to distribute the high voltage energy. Initial design of the distribution system called for high voltage feeders of No. 1/0, 3-conductor, 12-kv cables in 5-in. conduit runs along the walls of the tunnel. However, the installed cost of such a system proved to be more than 20% higher than the installed cost of an interlocked armored cable system of the same capacity and mounted on cable support racks along the sides of the tunnel.

Accompanying photos taken during construction show the cable rack system prior to pulling of the interlocked armored cables. The make-ready for cable pulling in a case like this is very important. When the pulleys are set along the rack runs, the cable is fed into the loops and pushed and pulled into position for the length of the runs.

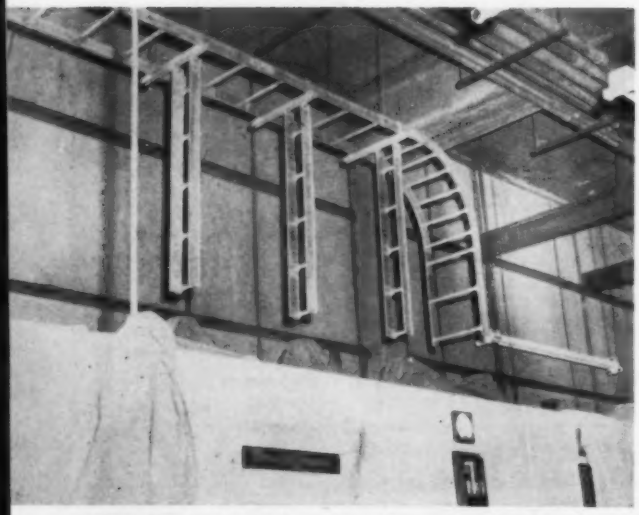
Another important determination in design of this system involved selection of secondary voltage for the unit power centers serving the buildings. For the cen-



SINGLE-LINE DIAGRAM of high-voltage switchgear shows incoming supply from 12,470-volt, 3-phase, 4-wire, wye line behind plant and the six feeders for the presently planned construction.



CENTRAL PLANT building houses equipment for supplying electrical energy and air conditioning to the other buildings. Layout of primary supply, switchgear and outgoing feeder cables on rack is shown here. The letters in the circles correspond to accompanying photos, with the arrowheads indicating the angles at which the photos were taken.



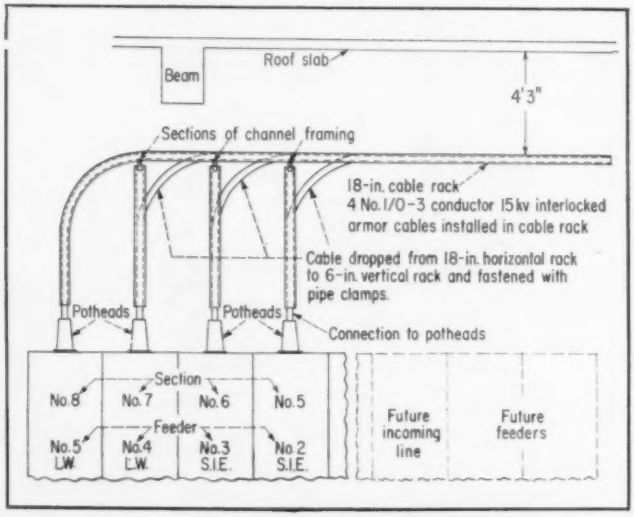


PHOTO A (as indicated on plan of central refrigeration plant)—View of main switchgear from front shows cable rack in position to support power feeders. Diagram at right shows details from rear of switchgear.

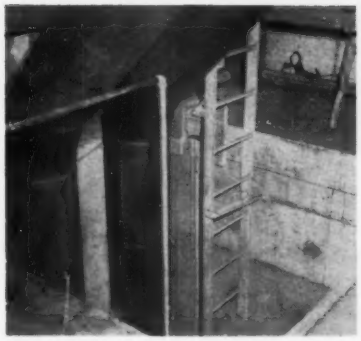


PHOTO B—Cable rack is carried down through opening in floor of central plant into utility tunnel below.



PHOTO C—Rack is brought into beginning of tunnel and secured along wall.



PHOTO D—View of utility tunnel looking back toward point at which rack comes down and tunnel starts. Rack is mounted on channel frame sections secured to inserts in the concrete tunnel wall.

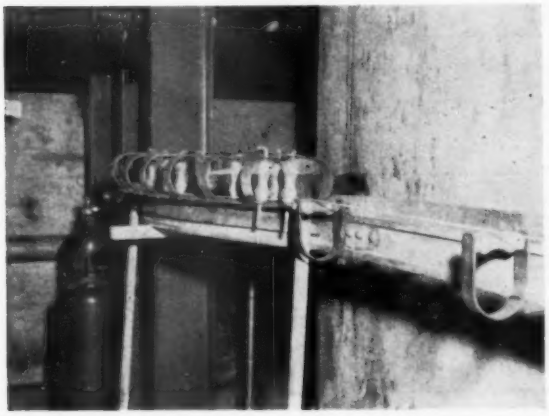


PHOTO E—Make-ready for cable pulling is shown here mounted along cable rack at first turn in tunnel. U-shaped steel supports with roller guides are mounted close together along the side member of the rack. For straight runs the roller assemblies are secured to the rack by banding wire. On the curved turn shown here, the rollers are much closer together and are welded to a length of angle iron which was slit at intervals along the flange and curved to conform to the rack. Other short sections of angle iron secure the curved assembly to the wall, and vertical pieces of pipe further support the rig. Throughout the tunnel, many special configurations of rollers welded to angle iron were carefully installed to assure ease, efficiency and safety in the pulling of the heavy feeder cables. Cables are pulled in on the roller guides and then lifted back onto the rack.

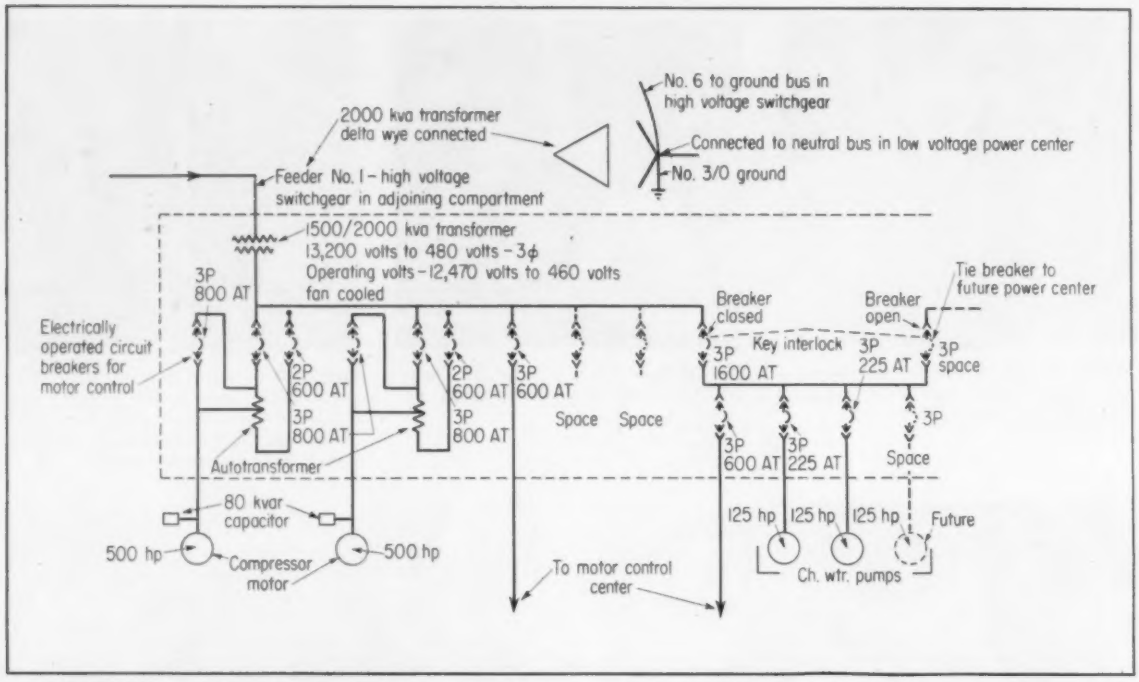


PHOTO F—Tunnel is narrower in branches than in main section immediately away from the central plant. Here, cable rack is also reduced in width to carry only two cable feeders instead of four.

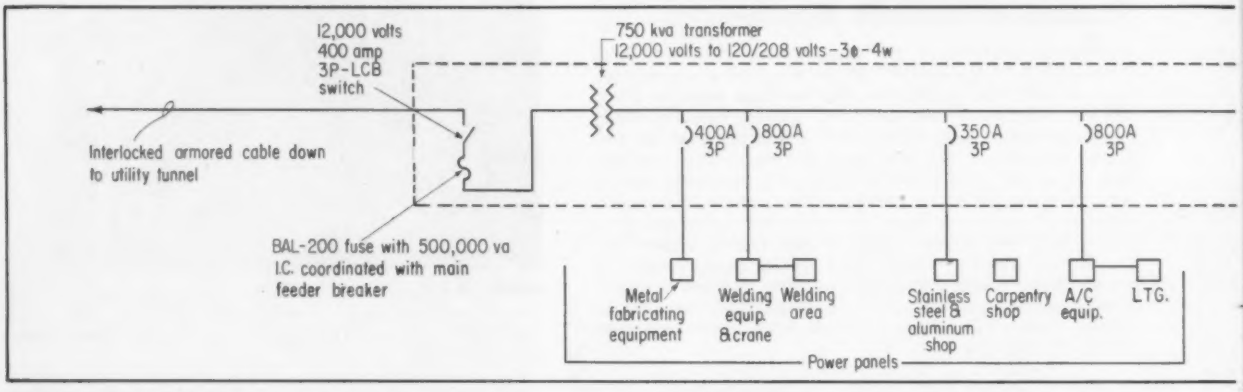
tral refrigeration plant itself, the very heavy concentration of motor loads dictated the use of a 460-volt substation unit. This was installed as an extension of the primary switchgear. From the 460-volt bus, two 500-hp refrigeration compressor motors are supplied through autotransformer type, reduced voltage starters. These starters consisted of electrically-operated circuit breakers in a start-run circuit, using a timing relay for each starter. This center also feeds two large motor control centers operating at 460 volts and supplies two 125-hp chilled water pumps.

For lighting and appliance loads in the central refrigeration plant, 120/208-volt, 3-phase, 4-wire circuits are derived from delta-wye transformers energized from one of the motor control centers. The secondary neutral points in these transformers are connected to ground wires which are run from the neutral bus in the power center. Each ground wire is the same size as the secondary phase conductors and is run to the transformer in the same conduit with the primary supply conductors. This ties grounded neutrals together at all three voltage levels.

In the other buildings of the plant, analysis of load conditions revealed distinct advantage in the use of 120/208 volts for the secondary of the power center. An unusually heavy concentration of tools, appliances and other equipment rated for single-phase and 3-phase use on 120/208 volts was the major load in each building. Initial design study included detailed consideration of the use of 840-cycle energy for lighting in the truck shop. This included design of the



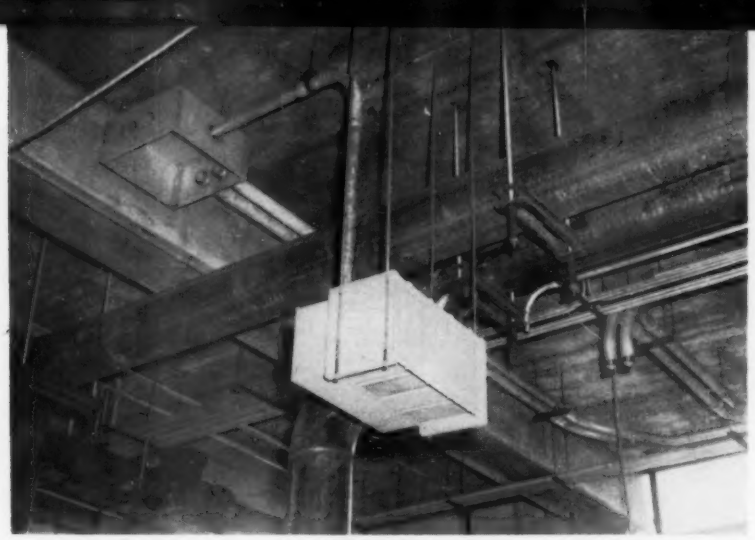
POWER CENTER adjoining primary switchgear in central refrigeration plant supplies loads in the building as shown. Careful provision was made for expansion of this power center when load demands it. Lighting and receptacle circuits for the building are supplied from transformers energized by feeders from one of the motor control centers. Refrigeration compressor motors are rated for 537 amps, full load and 2840 locked-rotor amps. Auto-transformers with 65% taps provide reduced voltage starting, with time-relay control of sequence of operations of electrically-operated circuit breakers.

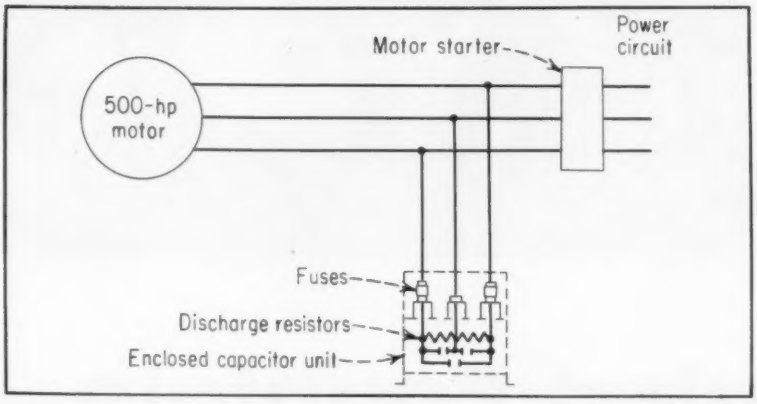


TYPICAL LOAD CENTER consists of step-down transformer and feeder switchboard. This center serves the truck shop. The 200-amp, non-expulsion type boric acid power fuses provide protection against overload and short circuits for the 750-kva transformer. This is common application for power fuses—as the final "protecting" overcurrent device at the voltage level, just ahead of the transformer stepping down to the next lower voltage level. Such fuses provide faster operation than the power circuit breakers back at the primary switchgear, affording proper coordination between the fuses which are the protecting overcurrent devices and the circuit breaker which is the protected overcurrent device. The fuses are used with the 400-amp load interrupter switch in one compartment of the unit load center.

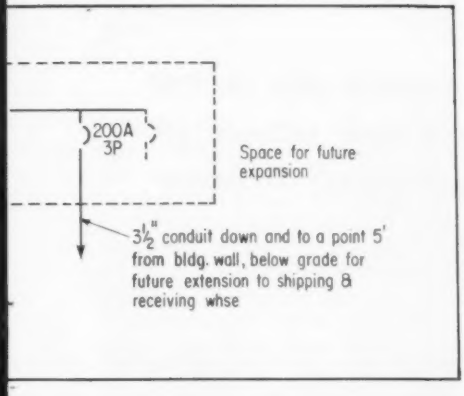
frequency conversion layout, the distribution feeders and the branch circuits using fluorescent luminaires with capacitor ballasts. On comparison with the conventional type of 120/208-volt lighting, however, the high frequency system proved too high an initial investment. The use of 480Y/277-volt distribution with fluorescent lighting from 277-volt circuits was also too costly because of the very large amount of additional transformer capacity required to supply the 120/208-volt loads.

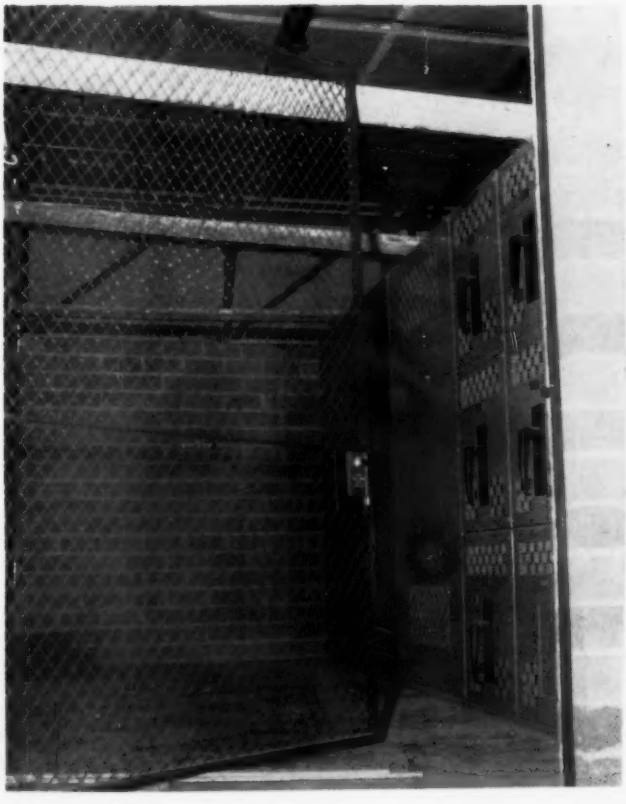
The planning, design and coordination of construction at the SIE plant has moved forward steadily with the help and cooperation of W. H. Hammond, Facilities Director of Southwestern Industrial Electronics Co. Architects of the project are George Pierce—Able B. Pierce, Houston, Texas.





PF CORRECTION for compressor motors in central plant is provided by suspended capacitor installation. Each motor is equipped with an 80-kvar unit as shown in photo and diagrams. Capacitor unit is equipped with fuses for overcurrent protection. Pullbox close to ceiling has two 3-in. conduits coming into it from right, to carry two 500 MCM RH conductors per phase for motor supply. Single 2½-in. conduit down to capacitor will carry three 250 MCM RH conductors. Two conduits to motor will leave left side of pullbox. Installation conforms to Article 460 of the NEC. Capacitor is hung from four ½-in. steel rods supported by nut assemblies in channel support inserted in ceiling concrete slab.





TRUCK SHOP load center substation is installed in a small enclosed area against one wall in a part of the building that is at a level four feet above the floor. Primary feeder comes up from tunnel into bottom of the transformer switch section. Cage door can be locked closed. From this center 120/208-volt feeders are carried out to power and lighting panelboards throughout the building.



CLUSTER of nine pools (four of which contain illuminated fountains), plus patterns of light emanating from floodlight pylons and windows of airport structures, provide night-time interest for airborne travellers and strolling visitors alike. Promenades and parking areas are lighted to average intensity of five footcandles, while maximum and minimum light levels throughout the entire central terminal area range from 8-fc down to a still-commendable 1.4-fc.

Illuminated Fountain



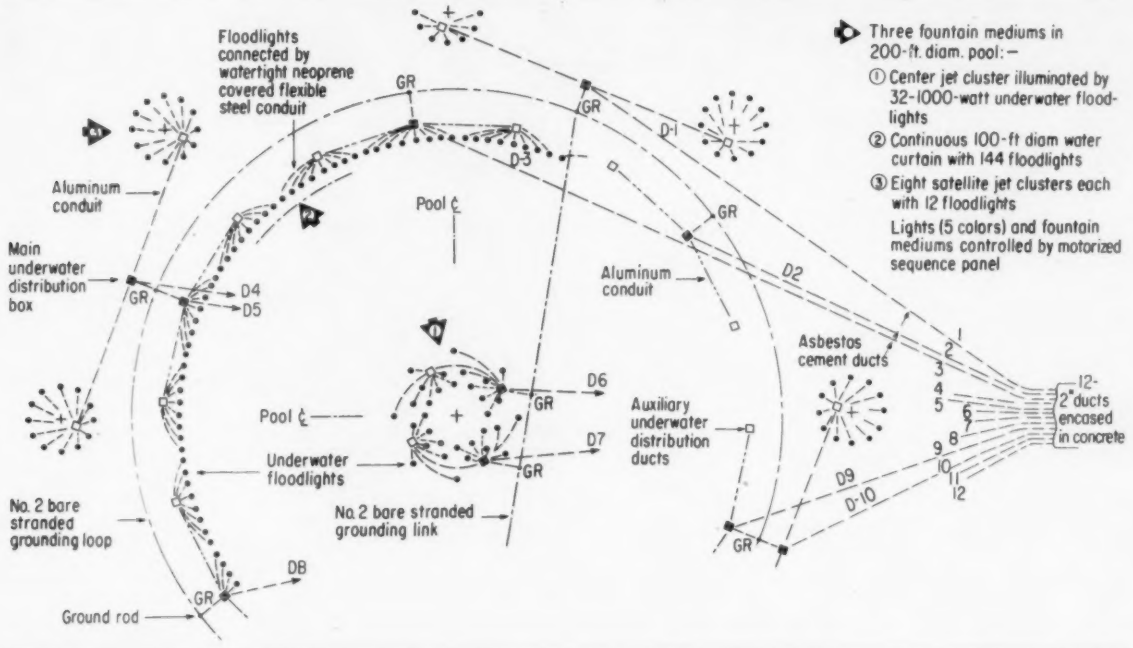
SEMI-CIRCULAR INCLINED RAMP descending to pool terrace is illuminated by weatherproof enclosed fluorescent fixtures incorporated into underside of railing (see arrow). CAA's new 11-story control tower can be seen rising in background.

New York's International Airport display has 308 underwater floodlights and three separate jet mediums regulated through motorized sequencing and electronic control.

A CLUSTER of nine pools, four of which contain illuminated fountains, was recently completed at New York's International Airport. A variety of lighting, control and motorized equipment was used in the installation. The largest of four circular pools which is described here, is typical of the electrical requirements.

This pool (200 ft in diameter) has a center jet fountain consisting of half a dozen nozzles (with 20-mm orifices) that throw water to heights varying up to 45 ft. This center jet is surrounded by a ring, 75 ft in diameter, containing 870 closely-spaced nozzles, with 3½-mm orifices that create a surrounding water curtain 18 ft in height. In addition, eight "satellite" jets, each consisting of multiple nozzles with orifices of 7½-mm, are equidistantly spaced around this curtain, 12 ft further out from the center.

Each of these three fountain mediums is served by a separate variable-speed pump (40-hp units for center and satellites; 75-hp for curtain), also by separate suction and discharge pipes, reducers and strainers, gate and check valves. Pump speeds, and resulting water pressures and jet heights are regulated by variable-speed motors and associated electronic control panels



LARGEST FOUNTAIN POOL, 200 ft in diameter, has three separate fountain mediums, each backed by a variable-speed pump. Total of 308 underwater floodlights, producing a 5-color spectrum, are regulated in sequence with countless water effects through the action of a motorized electronic controller.

keyed to a master synchronous motor-driven sequencing controller equipped with adjustable timing cams.

Floodlight Arrangement

Even more extensive in detail is the related lighting installation, for the center jet is surrounded by 32 underwater floodlights, the curtain by an additional 180 units, and each of the eight satellites by 12 floods. Floodlights surrounding center and satellite jets are variously equipped with red, salmon and blue plastic-type color filters above 500-watt lamps, except for eight central clear-lensed floods, while curtain-illuminating 300-watt floodlights are alternately provided with blue and lavender color filters.

This array of floodlights, 308 in all, is segregated into 80 separate circuits; 12 for the center, 36 for the curtain and four for each of the eight satellites, controlled by the same motorized sequencing control unit that activates the fountain jets.

During each complete cycle, the three jet mediums are operated separately and also in various 2-medium combinations, as well as collectively. Water pressures may be varied, so that center, satellite and curtain jets can be operated at any desired height within their respective maximum limits. This feature is particularly desirable because the heights of the water jets must be coordinated with the prevailing wind velocity.

Floodlighting is controlled with similar flexibility, so that colors are progressively added or subtracted, intensified or diminished, predominantly emphasized or blended to form a constantly-changing scene.

Extensive Underwater Wiring

Wiring between the control center and floodlights is via single-conductor No. 10 heavy-duty polychloroprene-jacketed color-coded 600-volt wire, carried into the pool through a 12-duct bank of 2-in. asbestos-cement conduits, with these ducts gradually fanning out to serve 12 main underwater cast-aluminum watertight distribution boxes (two center, six curtain and four satellite terminals). Subsequent circuiting is then via aluminum conduit that extends to an additional 22 underwater distribution boxes and, finally, circuiting to floodlight units themselves is through flexible watertight neoprene-jacketed steel conduit.

Grounding wires from floodlights are carried back through these steel conduits as far as the underwater distribution boxes, where they terminate at lugs provided for that purpose. The inter-connecting aluminum conduits serve as the grounding conductor to the main distribution boxes, which, in turn, are lug-connected by No. 2 bare stranded copper cable to an 84-ft-diameter No. 2 bare stranded copper cable grounding ring loop that is Cadweld-connected to ten 10-ft ¾-in. Copperweld ground rods.

Floodlights are supported by telescoping type brackets which may be adjusted both for height and declination, thereby permitting housings to be positioned above normal water level for servicing and relamping, and at or below normal water level for operation, being inclined towards or away from the center of the pool by angles varying up to 60 degrees from the vertical. Bracket legs, resting directly on the concrete floor of the pool, are secured by means of stainless steel anchor bolts.

Illuminated Ramp

This 200-ft pool is half-framed by the curved ramp that descends from an elevated promenade bridge; bridge and ramp alike being edged with waist-high wire-glass parapets capped by extruded anodized aluminum handrails that serve the dual purpose of enclosing slimline lamps as an additional lighting feature.

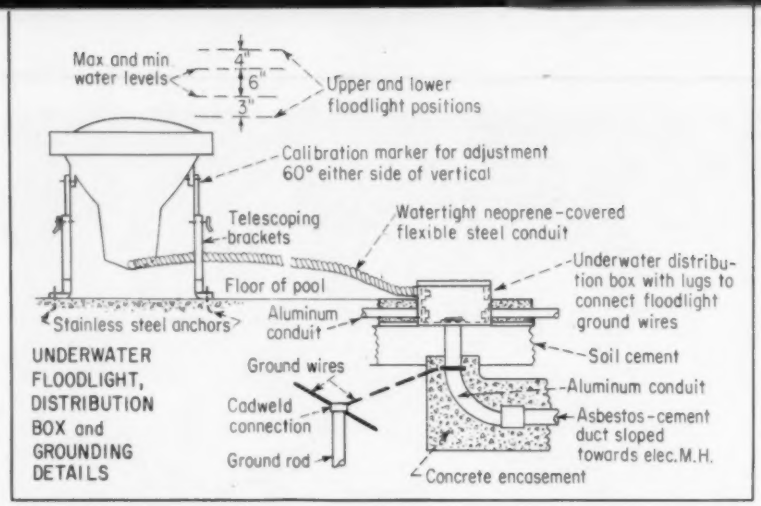
Since handrail-enclosed reflectors are inclined inwards 20 degrees, walkways are amply illuminated. And, since reflector openings are covered by frosted wire-glass panels, resultant light is also diffuse in character.

Lamps, 105 of them in this installation, are 57-watt T12 single-pin slimlines, with 120-volt 2-lamp ballasts positioned between every second lamp and also housed in the handrail cavity. Reflectors are of Alzak aluminum, while glass covers protect lamps and reflector surfaces from the airport's prevalent moist and salt-laden air.

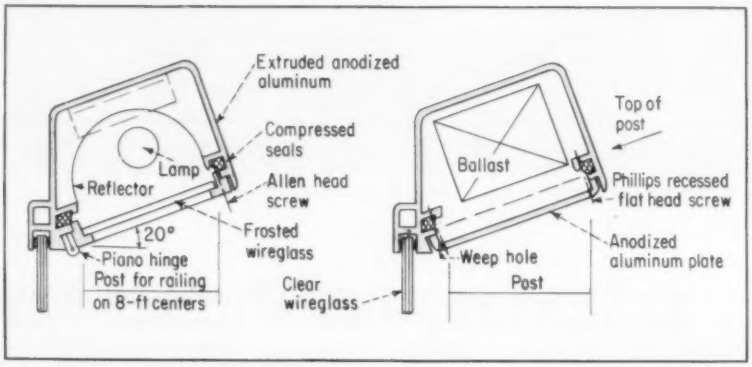
Power, control and motorized equipment related to this promenade and fountain component, housed in a vault and a pump house located beneath bridge and ramp, includes a 5-kv primary manually-operated switch; a 300-kva, 3-phase, 4160/480-volt transformer; magnetic starters for five pump motors (10-hp filter and well units besides the two 40- and one 75-hp fountain pump assemblies); electronic control panels for the variable-speed fountain-pump motors; three dry-type 480-120/208-volt delta-wye transformers for lighting purposes; a relay and magnetic contactor assembly for bridge lighting; the motorized sequencing control unit for fountain light-and-water effects, plus related high- and low-water cutoffs, heaters and vent fans, air breakers and safety switches, bus structures and wiring troughs.

Quality Installation

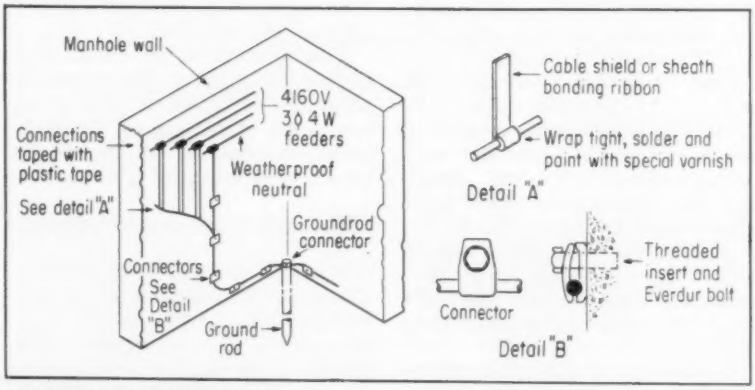
In the installation of cable and conduit, all wiring is color-coded. Straight splices in single-conductor 600-volt underground runs are effected through connectors, then double-wrapped with rubber and plastic electrical tape. Circuit identification is by means of tags secured to each end of each cable at its termination and in all manholes, cable pits, pull- or terminal-boxes, cabinets and wiring troughs.



UNDERWATER FLOODLIGHTS are supported by adjustable and calibrated brackets, with connection to distribution boxes via watertight neoprene-covered flexible steel conduits. Floodlight ground wires are connected to lugs in distribution boxes which are in turn tied to main grounding ring through bare stranded cable.



ALUMINUM HANDRAILS along elevated bridge and descending ramp contain slimline lamps and ballasts, variously covered by frosted wireglass panels or anodized cover plates. Reflectors are tilted downwards and inwards at angles of 20 degrees to direct illumination to walkways.



GROUNDING CONNECTIONS, for 4160-volt primary cables in manholes related to illuminated fountain installation, are made through sheath bonding ribbon (soldered, varnished and double-wrapped with plastic tape); cables secured by split clamps and everdur bolts, plus Copperweld ground rods driven in corner of each separate manhole.

Design and construction were under the direction of Port Authority civil and electrical design engineers, R. T. Miles and G. C. Kelly, Jr. Tully & DiNapoli and the Plymouth Electric Company were the contracting organizations that handled the structural, mechanical and electrical work for this meritorious lighting project.

ESTIMATING FORUM—IX

Operating Costs—Ratio of Labor Job Costs to Material Job Costs

By Ray Ashley, *Research and Consulting Engineer, Oak Park, Ill.*

QUESTION:

How does the cost of supplying labor compare with the cost of supplying material on an electrical construction job?

ANSWER:

On a dollar basis, the cost of supplying labor for an electrical construction project is from 2½ to 3½ times the cost of supplying material.

DISCUSSION:

It costs the electrical contractor from 2½ to 3½ times more, on a dollar basis, to supply labor to a construction project than it does to supply the material. Basic reasons for this are the operations involved. It is a relatively simple matter to get material to the job. The items are selected and ordered; a delivery follow-up and final check is made; and the bill is paid.

The supply and management of labor, on the other hand, involves many more operations. Among these are: supervision for the duration of the job; time keeping and the make-up of weekly payrolls; field engineering and drafting to facilitate installation; the purchase, supply and maintenance of tools; and numerous other items of labor support. All of these operations are designed to upgrade manpower efficiency and keep installation manhours to a minimum.

A more complete breakdown of job cost items attributed to material and labor is presented in the accompanying table developed for an electrical construction business with an annual volume of $500,000. Individual contracts comprising this total volume range from $100 to $80,000 with a Material-Labor Ratio of 60/40 (material, 60% of base cost; labor, 40% of base cost).

Division of Direct Job Costs between Material and Labor

ITEM	MATERIAL % of Purchase Price	LABOR % of Payroll
Estimating	1.05	1.35
Engineering	.80	2.88
Blue Printing	—	.10
Tools—Consumed and Depreciated	—	3.50
Selecting and Purchasing Material	.75	—
Follow Up and Coordinating Delivery	.50	—
Cartage and Special Delivery	.10	.10
Supervision	—	2.60
Travel Expense—Office to Job	.10	.21
Timekeeper	—	.50
Inspection—City	.10	1.10
Interest on Payroll	—	.50
Association Dues	.20	.70
Prorata Charges	—	.05
Reserve for Contingencies and Guarantee	.10	.50
Totals	4.10	14.09

Notes: Insurances are not included
Based on: Annual volume of $500,000
Individual contracts ranging from $100 to $80,000
M/L Ratio, 60/40 (material 60% of base cost; labor 40% of base cost)

Note that the costs for material run much lower than those for labor. The largest direct job cost for material is 1.05% for estimating. The comparable division of cost for labor is 1.35% for estimating. Other labor cost items are: 2.88% for engineering, 3.50% for tools and 2.60% for supervision.

The cost summary in the table shows 4.10% for material and 14.09% for labor. Thus, the cost of supplying labor is about 3.44 times that for material. Insurances are not included in these costs.

There are times when the three major items—estimating, engineering and supervision—might be considerably reduced. For "cost-plus" contracts, estimating expense is limited. Plans supplied to the contractor may serve as construction drawings thereby reducing engineering costs. Frequently, most of the supervision is by a foreman on the job payroll. Even if estimating and engineering were entirely eliminated and supervision reduced to 10% of the value shown, the cost ratio would still remain 3½ for labor to 1 for material.

OVERHEAD—The previous discussion has been about direct job costs. Research studies indicate that general overhead costs for a contracting business are in the approximate ratio of 3½ for labor and 1 for material. For the type and volume of business under consideration here, the following overhead costs (Electrical Estimating, page 129, McGraw-Hill) are typical.

Material	—	6.95%
Labor	—	23.89%

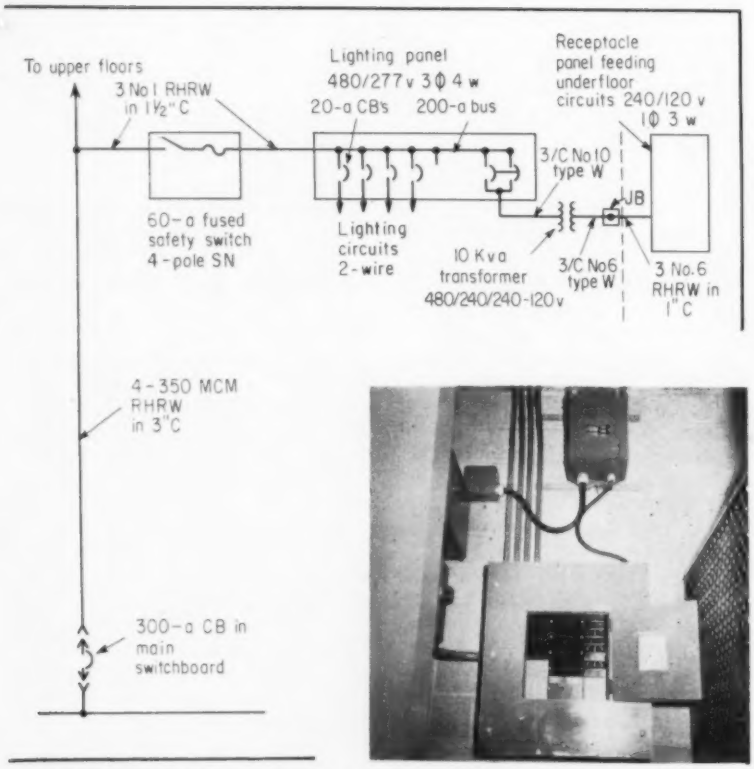
While there would be a wide variation in costs for the individual contracts comprising the annual volume, the ratio would be about the same.

High-Voltage Lighting Features

Low-Voltage Control

at Virginia's new State Office Building

The new 15-floor Blanton Building in Richmond, Va., is completely wired for 24-volt remote switching of its 277-volt, lighting system.

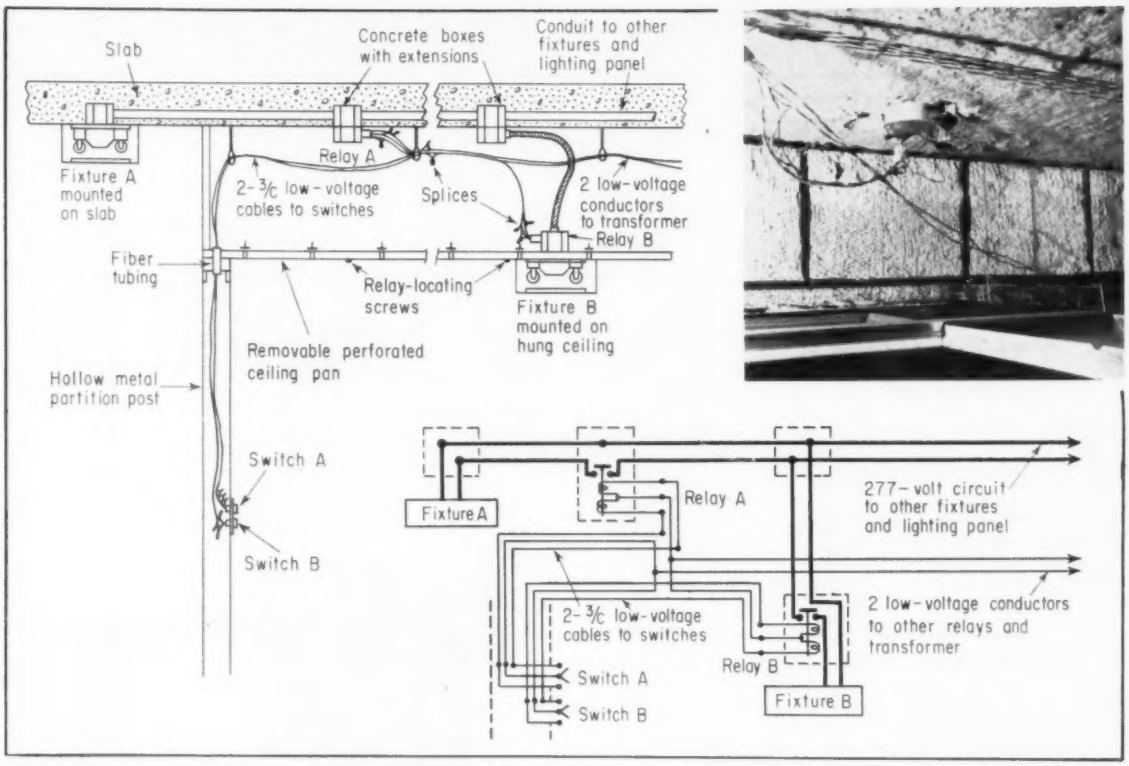


277-VOLT EQUIPMENT is mounted in an electrical closet on each floor, fed by riser from main switchboard in basement. Underfloor duct supplying business machines is fed from cabinets recessed in office wall, outside electrical closets. A 10-kva dry-type transformer in the closet provides 120 volts for these circuits as shown in the diagram. The low-voltage panel feeding remote-control relays and switches is visible on left wall in photo, immediately above fused safety switch.

THE first of several proposed new State office buildings in the Capitol Square area of Richmond, Va., successfully incorporates two of the more recent developments of today's lighting technology: 277-volt fluorescent lighting and 24-volt, Class 2 switching.

Low-voltage switching provides two big advantages in this particular application: (1) The need for bringing 277-volt wiring through room partitions to the local switches is avoided, producing safer operating conditions. (2) Partitions may be moved with less work and at a lower cost than with conventional wiring.

The office space in the building is divided by metal partitions into hundreds of small offices containing one or more desks, making impractical any plan for central control of the lighting. Each office therefore required that one or more switch legs be brought down through the hollow metal posts of the partitions to the desired operating height. Although proper grounding and careful installation would result in safe



LUMINAIRE SWITCHING is accomplished by 10-amp, 277-volt, latching-type relays mounted through knockouts in ceiling plenum space. Low-voltage conductors connecting transformer relays and switches are suspended from concrete inserts inside plenum. Sketch above shows a typical portion of the installation; connections are shown in diagram at right. Concrete box extension with relay is shown in photo, taken with sections of perforated metal ceiling pan removed. Louver-shielded luminaires contain two F40 T12 deluxe warm-white, rapid-start lamps; the 260-280-volt ballasts are protected from overcurrent by individual small glass-type cartridge fuses in each fixture.

operation, the extensive continuous metallic surfaces of the partitions —combined with the prospect of having 277 volts to ground—made 24-volt switch legs a logical and desirable substitute.

The nature of government operations at the State level calls for frequent changes in operating procedures and personnel which are usually accompanied to a certain degree by changes in office and desk space—hence the choice of an easily altered system of partitions.

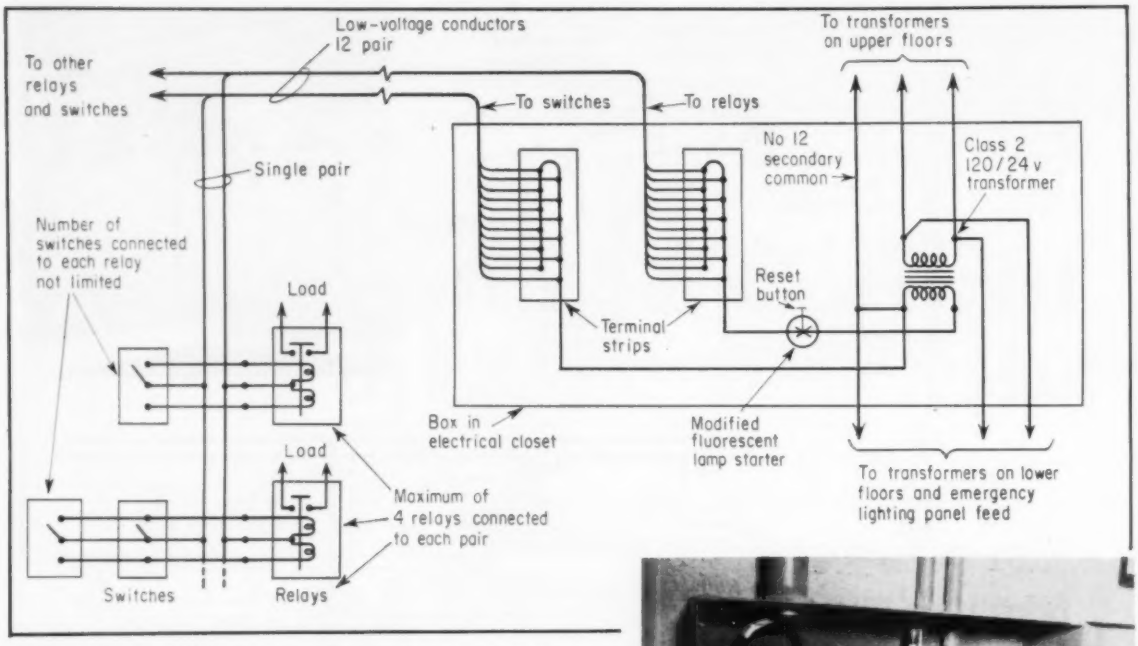
However, use of 277-volt wiring within the partition framing members would require that most of the alterations be done on an overtime basis or at the extreme inconvenience of employees in addition to those immediately occupying the modified office space, since entire circuits would necessarily have to be killed to remove and replace the wiring. No circuits need be killed with the 24-volt switching, however. The three No. 18 wires to the relay need only be disconnected at the splice in the ceiling, the wire pushed down into the post, and the partition moved to the new location. The switch and its wiring is thus intact, ready to be reconnected to the same relay after the new position of the partition has been established.

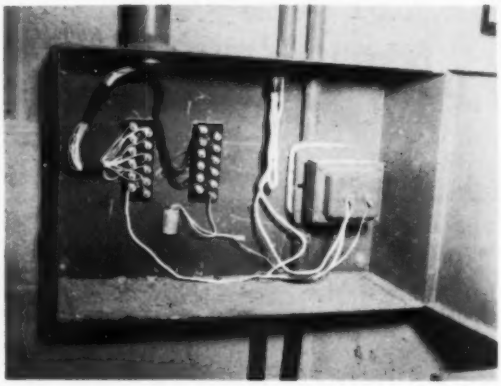
For easy access, all relays are located within the hung ceiling space as close as possible to the luminaires controlled. An unobtrusive plated sheet-metal screw is installed through one of the small holes in the perforated pan ceiling directly below each relay to facilitate locating the relays when repair or rewiring is necessary.

The 120/24-volt Class 2 transformers supplying the low-voltage circuits are rated at 35 va. Their energy-limiting windings make fuses unnecessary; even prolonged short-circuits on the secondary do no damage to the transformer or circuit wiring.

Transformers are mounted in an 18- by 12- by 6-in. box on each floor in an electric closet with lighting panelboards and transformers which step the voltage down to 120 volts for receptacle circuits. The 120-volt primaries of the low-voltage transformers are connected to a circuit from the building emergency lighting panelboard. Each 24-volt secondary leg is connected to a numbered terminal strip in the panel. All circuits to relays and switches have one conductor connected to one strip and the other conductor to the other strip, with both conductors going to the same numbered terminal on each strip. (See accompanying diagram.)

A modified fluorescent lamp starter was inserted in one of the leads from each transformer secondary to protect the relay coils from overcurrent. It acts as a small thermal circuit breaker to open the circuit to all relays and switches fed by the transformer. Although not normally required, it has been found that, in large commercial and industrial installations, maintenance men or other employees sometimes stack equipment or packages against the remote-control switches. If the switch were left in an energized position for several days, it could cause the relay wind-





LOW-VOLTAGE WIRING originates in cabinet in electrical closet. Conduit carries low-voltage conductors from terminal strip into ceiling plenum. Individual relays and switches tap off each numbered pair as required. Number of relays connected to each pair is limited to four. Although simultaneous operation of several relays is extremely unlikely, the 35-va rating of the transformer imposes some limitation on the total number of relays which may reasonably be used. Low-voltage system is entirely separate from the 277-volt lighting feeders, receiving its primary supply from a circuit to the building's emergency lighting panel in the basement.

ing to burn out, since these coils are rated for momentary duty only. Note that, even if held in the "off" position, the switch is still sending current through the relay "off" winding.

This thermal device also provides protection where a switch becomes stuck in the "off" or "on" position. Since the relay is a mechanically held (latching) type, the lighting fixtures remain either on or off, depending upon the position of the relay at the time the thermal cutout breaks the transformer circuit, thus calling attention to the trouble. The switches are inoperative, therefore, until the trouble is located and the reset button on the thermal device is pressed.

To maintain correct polarity on transformer secondaries, a No. 12 tie connects corresponding ends of the secondary windings of all transformers. This is important where relays may be controlled from switches connected to a transformer other than the one feeding the relay.

Such is the case with the motorized master switches and selector switches mounted in a special basement control cabinet. Three 9-position selector switches permit on-off control of all elevator lobby lights, first-floor foyer lighting, lighting on outside of foyer glass walls, stairwell lighting, and all exit and emergency lighting. These lights are controlled by turning the appropriate selector-switch knob to the desired circuit and pressing the momentary-contact switch either on or off.

Motor-driven, rapid-sequence switching of all emergency and exit lighting is also provided in this panel. Switching is accomplished by a motor-operated arm which rotates rapidly over contacts connected to each of the relays associated with the lighting controlled. "On" and "off" pushbuttons in the panel set up either the "on" or "off" contacts of the motorized switch through control relays.

In addition, a single "off" pushbutton permits all other lights controlled by the three selector switches to be extinguished at once by means of a second motorized switch. Thus the lights must be turned on individually as needed using the selector switches; but, while they may be turned off in the same manner, they may also be turned off all at one time after cleaning operations at night, when the building is to be closed for a holiday, etc., or if so required in an emergency.

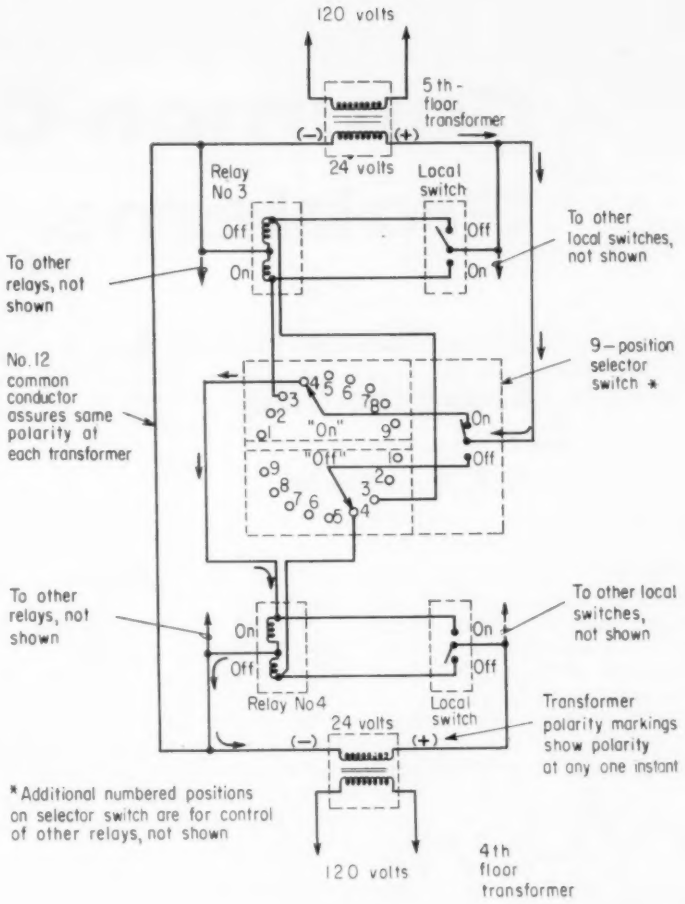
The building's electrical consultants, Wiley & Wilson, of Richmond, estimated that approximately $25,000 in electrical construction costs were saved by adopting the 480/277-volt service with low-voltage switching. Electrical contractor was E. C. Ernst Inc.; Merrill Lee was the architect—both of Richmond.

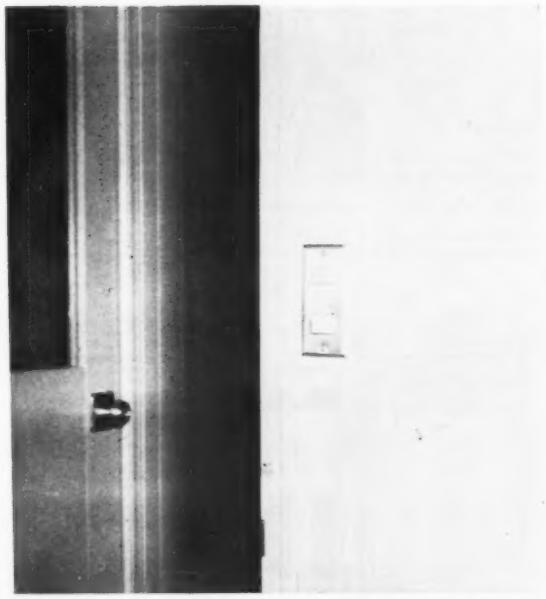
PROPER PHASING of transformer windings is necessary where any one relay may be operated from switches fed by different transformers, such as the selector switches used to control the stairway and corridor lights at the Blanton Building. Use of the No. 12 common conductor between transformer secondaries is clarified by the accompanying diagram.

The relay to be controlled by the selector switch is chosen by rotating the knob to the desired number (such as No. 3). The momentary contact switch is then pressed "on" or "off", connecting the 5th-floor transformer through the No. 3 "on" or "off" contacts on the selector switch to the appropriate winding of the No. 3 relay, then back to the other side of the transformer.

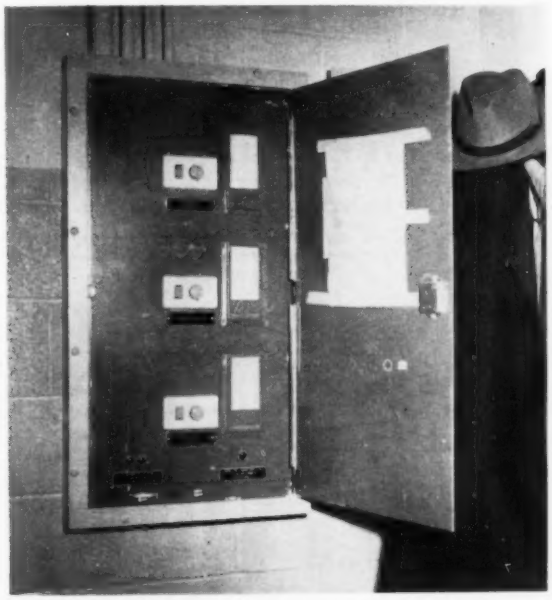
Assume, however, that the knob is rotated to position No. 4, as shown in the diagram, and the switch is pressed "on". The circuit established, shown by the arrows, is from the (+) side of the transformer on the 5th floor, through the selector switch contacts, through the "on" half of Relay No. 4, and back to the (—) side of the 4th-floor transformer This closes the load contacts of the relay (not shown) and turns on the fixtures controlled by that relay.

If the transformer windings had not been phased out initially, with the No. 12 common conductor connected to insure proper phasing, the circuit might have been established from the (+) side of one transformer to the (+) side of the other. The ac current would thus be canceled out, and no current would flow to operate the relay.





SWITCHPLATES of stainless steel for local switches were designed specifically for this installation to fit on the narrow, hollow vertical partition posts. Standard switchplates were too wide. Individual switchpates contain openings for one, two or three switches.



SELECTOR SWITCHES and master switch pushbuttons controlling elevator, lobby, stairway, exit and emergency lighting are mounted in basement panel. Master switches controlled by the pushbuttons at the bottom of the panel are enclosed in separate wall-mounted cabinets.

Common Code Problems

Why Service Heads Are Installed Above the Drop

By B. A. McDonald

SO MANY practical problems arise in locating service entrance heads with respect to the service drop attachments, that the requirements of Section 2337 may be overlooked or its intent may not be clear. Typical of the questions which come up is one which described an installation in which the service drop conductors were anchored above the level of the service head but looped down to splices below. Did this satisfy the intent and requirements of this code section?

A discussion of the background of code requirements will help to clear up such questions.

The second to last sentence of Section 2337 reads as follows: "To prevent the entrance of moisture, service entrance conductors shall not be connected to the service drop conductors at a point above the level of the service head or termination of service-entrance cable sheaths."

This provision first appeared in the 1946 code as a revision of the same section in the 1940 code. The 1940 version read as follows:

"If service entrance conductors are connected to service drop above the service head, the insulation shall be removed for ½ in. at the lower part of the drip loop to provide drainage."

The objective of the 1940 rule was to minimize the possibility of water entering the service entrance conductors at taped joints, and then flowing between the strands of the copper conductors down into the meter or main switch enclosure. When the service entrance conductors are connected to a service drop at a point above the level of the servicehead, water entering a taped joint would be forced to flow through the strands of the conductor due to the hydrostatic head established. This however would be prevented if ½-in. of insulation is removed from the lower part of the drip loop. Fig. No. 1 shows how the hydrostatic head is established and how it is eliminated by the removal of the insulation.

This 1940 rule was short-lived since the removal of insulation, especially on large services with conductors in multiple, presented a hazard, possibly more serious than the one it was intended to safeguard. As a result, the rule was revised in the 1946 code, as it now appears in the 1956 code. The present clause which prohibits the connection of a service entrance conductor to a service drop at a point above the level of the service head intends to satisfy the desired safeguards as covered by the 1940 code. This opinion may be verified by reference to the Abbott and Smith

Fig. No. 1
Section 2337 — 1940 Code

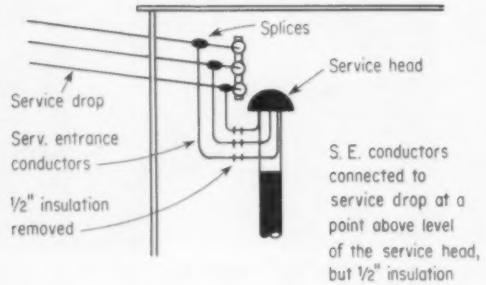
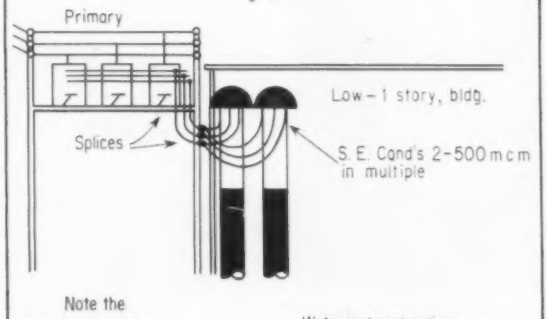
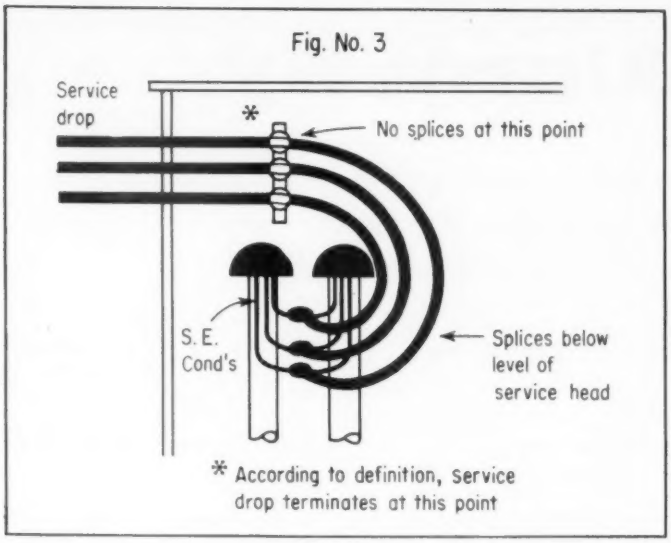


Fig. No. 2





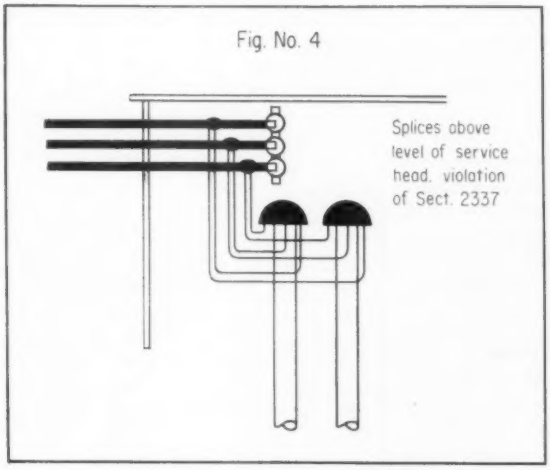
N. E. Code Handbook, in the 1940 through 1953 editions.

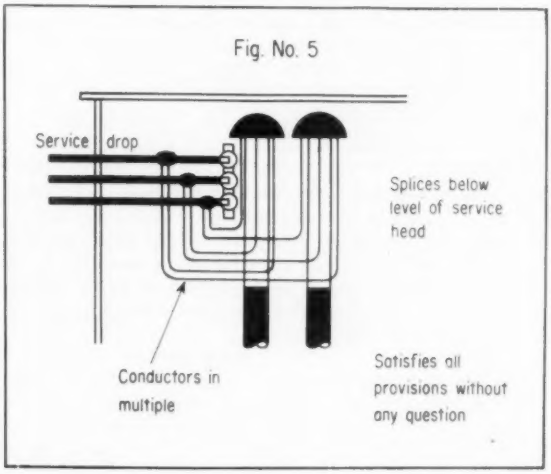
About 20 years ago, I inspected a service in an industrial occupancy where water flowed out of the meter box during a heavy rainstorm. The service consisted of several large conductors in multiple connected to an adjacent transformer bank. See Fig. No. 2. Investigation indicated that water entered the conductors during a rainstorm at the taped splices, and since some of the splices were at a level above the service head, the hydrostatic pressure forced the water to flow down the conductor, between the strands, to the meter box. The service was replaced and when sections of the insulation were removed from the old service conductors, evidence of moisture and corrosion, in the form of a green deposit on the copper conductors, and the condition of the corroded rubber insulation provided an answer to the water accumulation in the meter box. It should be noted that the splices at the transformer bank were at a level above the service head.

With this brief history of the background of Section 2337, let us return to the question of the looped down service drop. Fig. No. 3 roughly illustrates the question. In this case the connection of the service entrance conductors to the service conductors is below the service head, and it appears that the code rule is fully satisfied. While there is no hydrostatic head, some folks contend that the water, flowing on the exterior surface of the service conductors, would enter a poorly taped splice with sufficient pressure to force a path through the strands of the service entrance conductors down to the meter box. While I am unable to pass judgment on this theory with a background of experience or authority, it appears evident that the drip loop will tend to drain most of the water from the exterior surfaces of the conductors, and little, if any, water would force a path through the splice. In view of the foregoing, it appears that this service satisfies the provisions of Section 2337. According to the definition, a service drop terminates at the first point of attachment to the building. As a result the status of the conductors from the point of the building attachment to the service entrance connection is questionable and should be clarified.

Fig. No. 4 shows the same service directly connected to the service drop at a point above the service head. In this case we have a definite violation of Section 2337, and water may enter a poorly taped splice and find its way to the meter box as previously described.

Fig. No. 5 shows the same service, with the service head above the point where the service entrance conductors are connected to the service drop. In this case there is no question with respect to satisfying the provisions of Section 2337, and any question of doubt which might prevail, as in the case of Fig. No. 3, is eliminated. Regardless of code rules, I am inclined to agree that this is the most desirable method of procedure.





Seven schools in one city protected by . . .

Vandal Alarm System

A unique sound surveillance system is now on duty to inform city police headquarters of intrusions or disturbances at any of the city's schools during the night and other times when the school is left unattended.

By J. F. McPartland

AN AUDIO surveillance system today protects all the schools in one city against attacks of vandals. This system is designed and laid out to detect the presence of intruders within any of the school buildings, to discreetly notify the local police of the intrusion and to provide a means for the police to listen in to any sound in any of the schools. The system is used only during those times when the school is closed.

Basically, the overall system may be divided into three segments:

1. The individual school detection circuits.

2. The leased telephone lines into police headquarters.

3. The central surveillance-and-alarm panel at police headquarters.

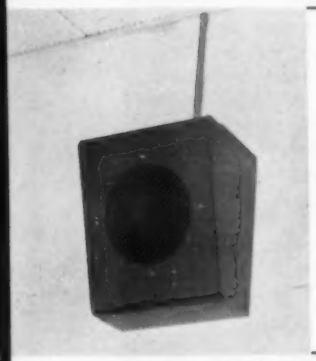
Each of the seven schools protected by this system has a number of wall mounted loudspeakers strategically placed throughout the building. These speakers are used as microphones in this system, i.e., any air pressure variations due to sound will act on the speaker diaphragm, causing motion of the speaker voice coil to produce an electrical signal. Although the specific layout of speakers varies from school to school, the general approach is similar. Speakers are placed in each school to provide sound pickup from all areas of the building. They are wall mounted in the corridors, in the gym, in the auditorium and in the cafeteria. The layout was made to provide sound pickup with greatest sensitivity in those areas through which intruders would most likely pass.

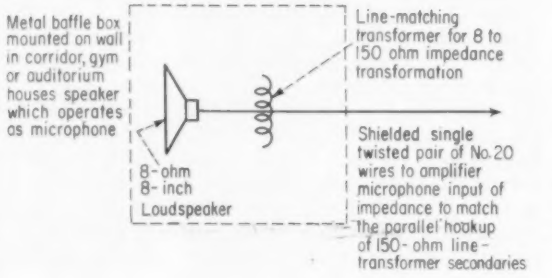
From each of the speakers in a school, a shielded single twisted pair is run to a centrally located system amplifier in the school custodian's office. These wire runs are almost completely concealed by running them in walls and above acoustic ceilings. Where they are not concealed, they are run in surface raceway to the individual speakers.

Each speaker is mounted in a metal baffle box and is equipped with a line matching transformer to match the 8-ohm voice coil impedance to a 150-ohm line impedance. At the school amplifier, the speaker lines are connected to microphone inputs equipped with plug-in type, low-impedance input transformers. Depending upon the locations of the different speakers, the input lines were connected to separate channels or a few of the lines were paralleled to a single input. This is described fully later.

The amplifier used in each school was installed as shown in accompanying illustrations of one of the schools. The unit is a standard preamplifier with five microphone input channels and arranged for 600-ohm output to feed a telephone line. Each of the five input channels has its own gain control and a master gain control adjusts the output level into the telephone line. All of the input channels are internally paralleled into one output from the unit.

From the amplifier unit in each

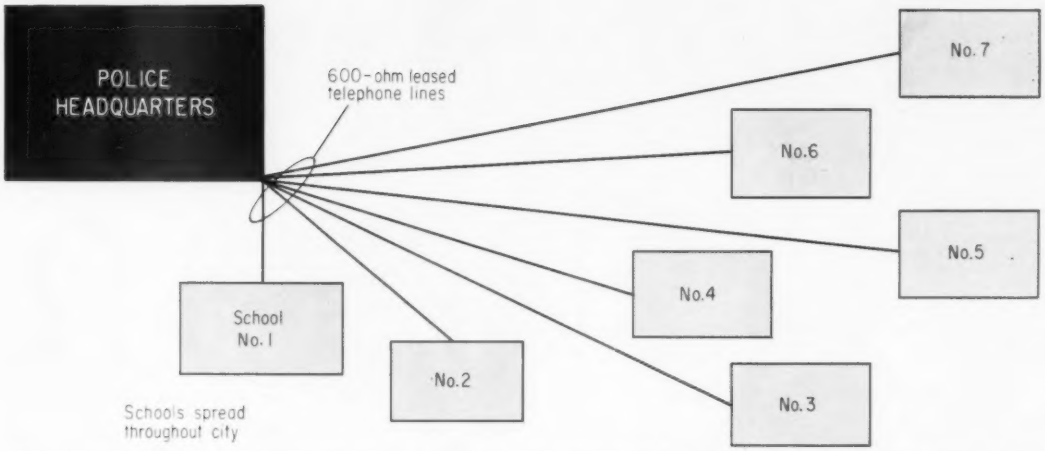




MICROPHONE PICKUPS mounted throughout the school buildings are actually 8-in. loudspeakers operating in reverse—sound pressure on cone moves voice coil in magnetic gap to generate signal in voice coil. Speakers have high sensitivity and wide-range frequency response. Photo at left shows typical speaker wall-mounted in school corridor.

The vandal alarm system described here was the subject of an editorial by W. T. Stuart, in our October 1957 issue. As explained there, this system was designed to protect a city school system against the rising tide of juvenile vandalism. In the city where this new system was installed, a single recent incident of destruction of school property by vandals cost the city, in excess of their insurance coverage, an amount equal to the cost of the new system.

In the story here, only those details which are of interest to the electrical construction industry are presented. Internal details of the equipment are minimized in the interests of security. And because the system provides discreet surveillance and is intended to facilitate apprehension of intruders, the name of the city involved here is withheld.—J.F.M.



SYSTEM LAYOUT has all seven schools in city connected into police headquarters over separate 600-ohm leased telephone lines.

school, a leased telephone line provides connection into police headquarters. Each line is a 600-ohm audio frequency line.

At police headquarters, a floor standing control cabinet is the heart of the entire system. This unit houses a variety of components as shown in illustrations on next page. The seven sets of 600-ohm telephone input lines come into this cabinet. The entire package is powered by cord connection to a standard 120-volt receptacle. This equipment is turned on in the evening shortly before the custodians at the schools leave the premises for the night. At that time, each school amplifier is turned on by the custodian by means of a simple key operated toggle switch. The system is then in operation and is ready to function. The main pilot light on the central control is lighted to show that the control cabinet is energized. The red pilot lights are not lighted; the toggle switches for alarm buzzer defeat are in the "up" position; the green pilot lights are not lighted; and the key-operated "Normal-Defeat" switches are in the "Normal" position. The volume control on the amplifier driving the monitor speaker is preset to a proper gain position for listening to the schools over the monitor speaker. This control cabinet stands just behind the main desk at headquarters where an officer is on duty at all times.

In the normal condition as described above, internal relays are sensing that the normal quiet level prevails at all areas in the schools. Should this normal noise level be exceeded anywhere in the schools, an alarm buzzer would sound, the red alarm pilot light associated with that school would light and that school would be connected to the monitor speaker. However, if that normal quiet level should fail—due to failure anywhere in the system equipment—a relay which operates on that normal quiet level would also sound the buzzer and light the green pilot light associated with the particular school in which the equipment has failed. This provides fail-safe operation.

Typical operation of the system is as follows:

1. If the noise level in any school rises above the normal quiet level, the alarm buzzer in the central panel sounds, calling the attention of the officer on duty. In addition, the red pilot light associated with that school comes on to indicate which school is producing a noise signal and the audio output of the pre-amplifier in that school is connected to the monitor speaker.

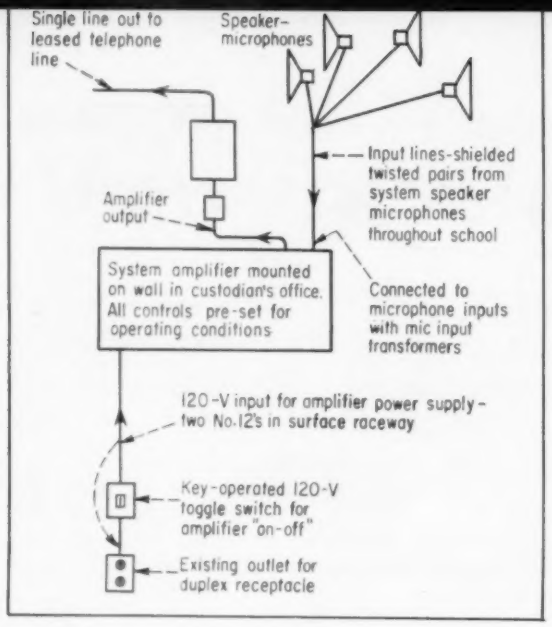
2. The officer then throws the momentary contact alarm buzzer defeat switch to the down position and holds it there while he is listening to the school on the monitor speaker. The officer can then listen to any sounds in that school. If there is audible evidence of intrusion or suspicious sounds, a squad car is immediately dispatched to the school. All this is done without any warning to the intruders. The "Normal-Defeat" key switch kills the alarm buzzer and red light. But if another noise comes through, they will operate again.

3. To provide a constant check on the operating condition of all school channels feeding into the control center, a cycling circuit picks up the output of each school every ten minutes and checks the level of sound output (ambient noise level at school and internal amplifier noise) to make sure the normal threshold level of noise is present. If the normal channel noise is present, the channel is operating properly. If, however, that level does not obtain, there is some trouble in the circuit to the school. A buzzer will sound and one of the green pilot lights will indicate which school is in trouble. The officer can check the channel on the circuit monitor and then dispatch a car to the school to check on the trouble. To defeat the trouble buzzer and green light, the "Normal-Defeat" key switch can be momentarily turned to the "Defeat" position and then reset to "Normal".

4. If ever it should be necessary to maintain a continuing surveillance on the schools, a set of earphones can be plugged into the jack provided and the all-school monitor switch turned "ON". The officer can then "hear" all of the schools connected to the system. This setup might be desirable at any time when vandalism is anticipated—such as on Halloween.

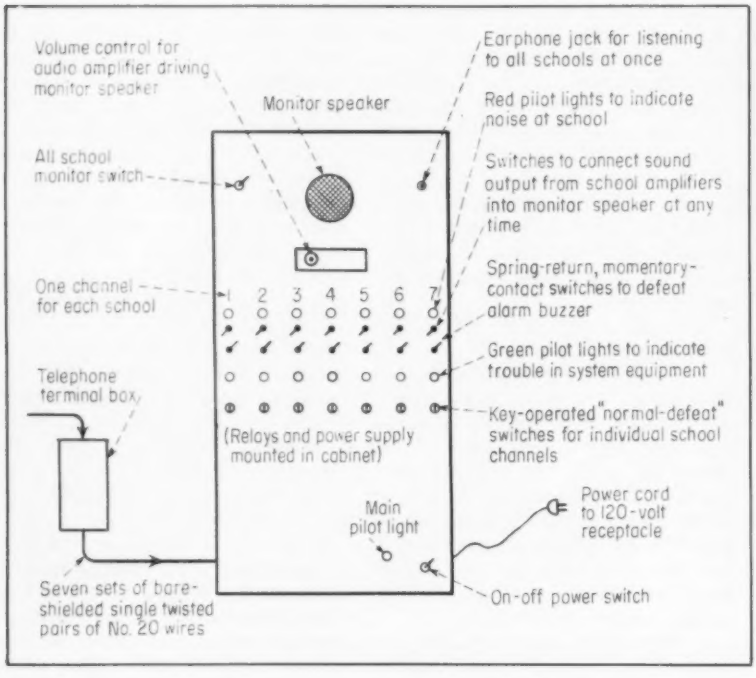
5. Any or all schools can also be monitored on the monitor speaker at any time by using the monitor switches on the control cabinet. These switches connect the schools into the monitor speaker.

In the layout of the system described here, placement of speakers was one of the most important considerations. For each microphone-speaker, it was first determined how much area the speaker should cover.





SCHOOL AMPLIFIER is supplied from speakers throughout building and feeds into leased telephone line to police headquarters. Typical layout of equipment on wall of custodian's room is shown here. Layouts in all schools are generally similar.





MAIN CONTROL CENTER of the overall system is this floor-standing cabinet assembly installed just behind the main desk at police headquarters. The seven incoming telephone lines are connected into the lower left hand side of the cabinet from a nearby telephone terminal box.

Then the speaker was placed as near as possible to the center of that area. But this was complicated by the necessity for placing each speaker in the quietest part of the area, away from outside street noises. By so placing each speaker, it was possible to adjust each relay in the main control panel for a very low level of normal threshold noise. This, of course, provided maximum sensitivity of noise pickup. If speakers had been placed close to outside walls where street noise is high level, the normal quiet level of relays would have had to be set much higher, thereby possibly masking noise made by intruders.

In tying speakers into each school amplifier, careful adjustment of level was made. Speakers which operated in areas adjoining streets, where the noise levels were about the same, were connected in parallel into one microphone channel. In a typical case, three 150-ohm lines were connected into a single 50-ohm input. Speakers in areas with very high or very low noise levels were provided with individual 200-ohm input channels.

Coordination of each school amplifier with its associated relays was made on an individual channel basis. One-by-one, each channel gain control was adjusted for maximum sensitivity, with equal level from all of the channels. Then the master gain control was adjusted in combination with minimum and maximum settings of associated relays in the main control center at police headquarters.

The complete system was designed and the equipment built by the David Bogen Co., Paramus, N. J. Installation was made by Electronic Sound Corp., Paterson, N. J.

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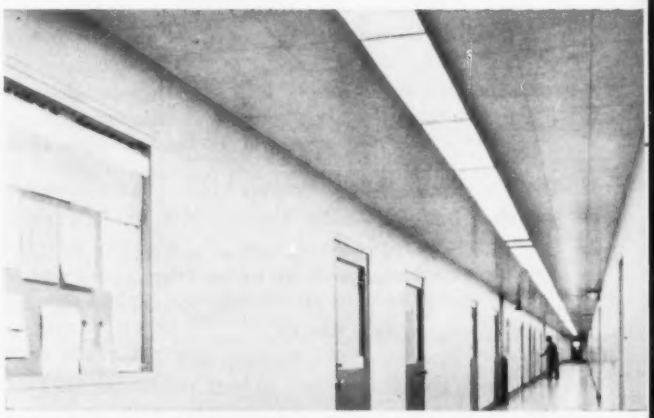
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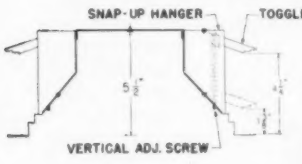
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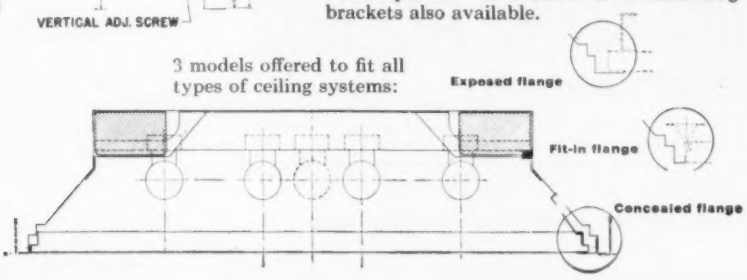


STRIKING, PLEASANT ACCENT for an up-to-date building corridor: Sylvania recessed lighting troffers continuous-row mounted with acoustical ceiling materials.

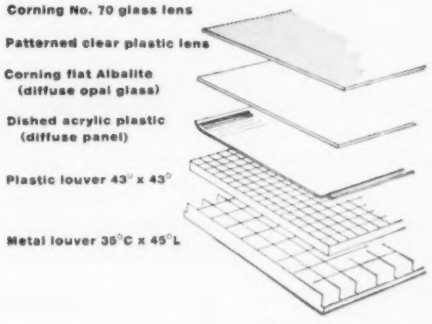


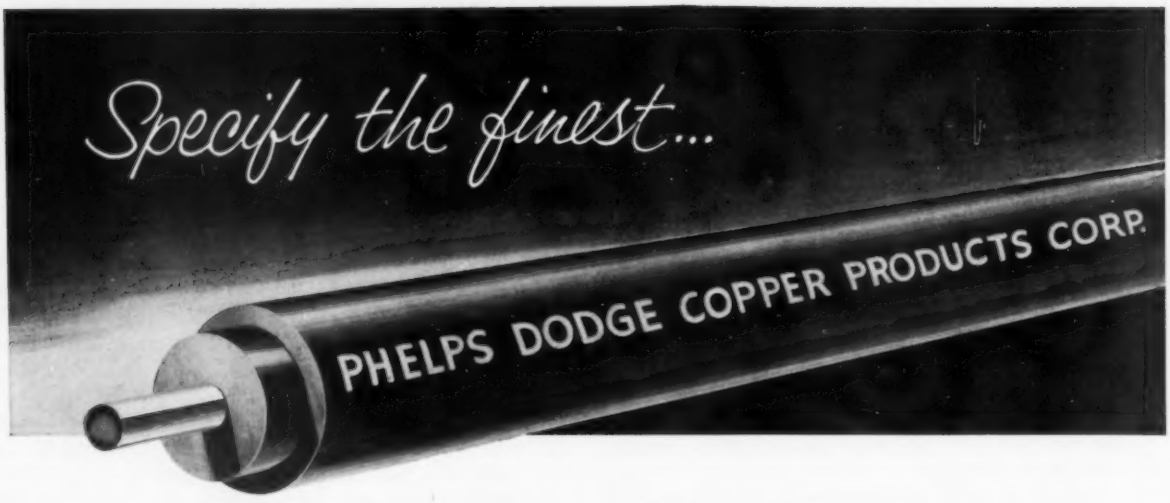
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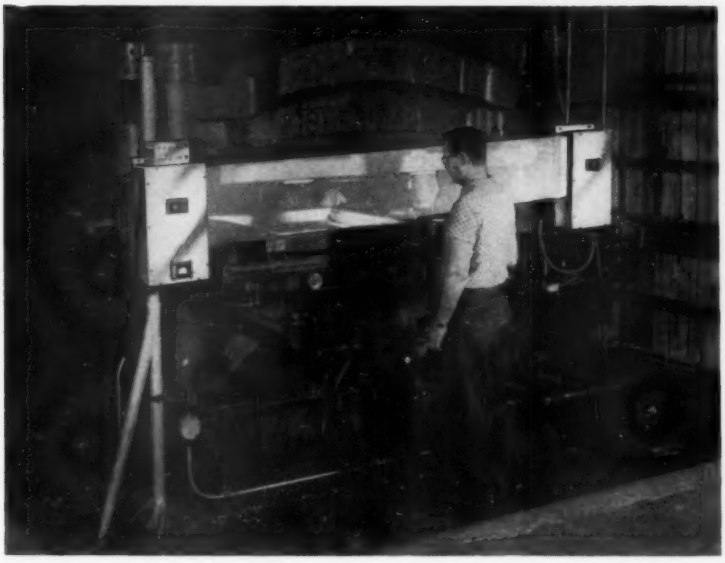
- Much greater resistance to heat and oxidation. This permits a higher temperature rating, with consequent reduction in conductor size and in cable cost.
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Electronic Control Press Guard

PRODUCTION

Production increases of up to 140% have been reported through the use of the new "Curtain of Light" press guard, developed by Electronic Control Corporation. Unlike conventional photoelectric relays, which leave dangerous gaps between individual narrow beams, the Curtain of Light projector throws a broad beam of light (up to 18 in. high) across the danger area of the press. If this light curtain is broken at any place—even by the thickness of a man's wrist—the press is stopped. When the operator's hand is withdrawn to a safe position, the press can be tripped automatically. Production goes up due to the extra time gained by the operator, who can be reaching for new stock instead of pressing the pushbuttons of conventional mechanical guards.

The control equipment is fail-safe, that is, it continuously and automatically checks its own operation. The press can operate only as long as the Curtain of Light is in working order. Should any part fail, power be removed, or an attempt made to "cheat" the equipment, the press is automatically stopped.

The equipment safeguards not only the press operator, but other plant personnel and visitors. And it has been reported that use of the device helps raise the operator's morale, since he works without interference from obstructing guards or time-wasting routine. Fatigue is reduced by the simple, smooth, natural hand motion.

The Curtain of Light press guard is used primarily on presses that can be stopped instantaneously, such as hydraulic or friction-clutch machines. Installations include OBI's, straight side; punching, forming, welding presses; and broaching machines. It may also be used to prevent accidental tripping of mechanical "dog clutch" presses, provided they operate at 100 strokes per minute or more.

The equipment system consists of a projector, a receiver, and a control unit. Projector and receiver housings are usually bolted directly to the frame of the press or to the floor. Shock mounts isolate the lamps and tubes from the machine's vibration. The control unit features plug-in components for easy servicing.

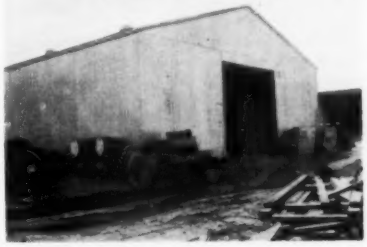
Steel Job Shanty Proves Good Investment

FIELD OFFICE

Contractor's "job shanties" or field offices can range from a few hundred to several thousand square feet in area. Size and type of structure depends upon a number of factors: size of project, number of men, quantity of materials and tools needed to be stored and job duration. Initial cost, depreciation, life of structure, and resale or reuse value also must be taken into consideration.

Although the initial cost of constructing an all steel building to serve as a job shanty is a great deal higher than conventional wooden type structures, the end results more than often equal those of wooden buildings. This fact was realized by Kehne-Foster Electrical Contractors who are handling a job as a "joint venture".

It was decided by members of both firms that since the job would require 40 to 50 men for as long as one year, a building of good size would be needed to provide office space, plus a sizable area for stock and tools. Besides these facts, the building would have to be completely weatherproof and partially heated, because the job will last through the winter months in an area where temperatures often drop 30° below zero.



FIELD HEADQUARTERS of Kehne-Foster Electrical Contractors on a large joint-venture job in Rochester, Minn., is a 40 ft by 80 ft corrugated steel building. Structure houses engineering and job office, field shop and warehouse. Truck entrance at warehouse end of building permits indoor loading and unloading of delivery trucks.



STORAGE RACKS for material located in temporary job shanty are constructed of Kindorf steel channeling with plywood and wood planks used as shelving. When job is terminated racks will be disassembled and reused on other projects.

TOUGH PROBLEM *Licked!*



2-Point and 3-Point "PRA" Primary Resistor Starters at Sears Oil Co., one of nation's largest independent oil and gasoline distributors.

by New "PRA" REDUCED VOLTAGE STARTERS and *on-the-Job Service*

The Sears Oil Company, Rome, N.Y., had to control and protect large horsepower motors for pumps providing a flow into and out of storage tanks at its multi-million dollar deep water storage depot. Local power company regulations made reduced starting voltage a "MUST." Arrow-Hart was called in to solve this problem. Working with John Reed, local electrical contractor, Arrow-Hart field engineers came up with the answer — new Arrow-Hart Type "PRA" Primary Resistor Reduced Voltage Starters. Providing the necessary control and protection, they also met all local regulations governing low-voltage starting.

Small, light weight "PRA" Motor Controls, with "RA" Magnetic Starters, provide dependable, economical control. "Ribflex"* and "Edgeohm"* resistors assure correct starting current limitations. Overload relays are A-H bi-metal type. Starters can be wired for 2-wire automatic control or 3-wire push button control.

Whether your need is the *right* product for the job, or on-the-job assistance — or both — Arrow-Hart can serve you.

Write for more data on "PRA" Resistor Starters and complete information on A-H Sales Engineering Service to the Arrow-Hart & Hegeman Electric Co., Dept. ECM, 103 Hawthorn St., Hartford 6, Conn.

* TRADE MARK OF WARD LEONARD ELECTRIC CO.

ARROW AH HART

Quality since 1890

MOTOR CONTROLS · ENCLOSED SWITCHES
APPLIANCE SWITCHES · WIRING DEVICES

ARROW AH HART



CONDUIT STOCK is piled outside to facilitate selection and requisitioning for job requirements. Upright timbers seperate piles according to size.

After investigating several types of pre-fab buildings, a corrugated steel structure 40 ft by 80 ft was decided upon. Footings were installed and a concrete deck poured for the administrative and engineering section. In order to reduce costs, a gravel bed was laid to supply the "floor" throughout the warehouse area. Wall-board partitions were used to separate the office from the storeroom and provisions were included for heat. A large overhead door located at the opposite end from the office area is used by trucks for the delivery and despensing of materials. A 3-wire 110/220-volt service was installed for power and lighting.

Because of the steel construction of the building little or no maintenance will be required during the period it will be in use; therefore depreciation values will be almost non-existent. After the job is completed the building is easily disassembled with minimum waste and it can either be moved to another job site or sold with a good chance of recovering most of its initial cost. The firm already has had several advance offers to take the building off its hands at the completion of the project. The only expenses not recoverable, of course, are those of installation of footings and floor slabs and erection of the structure.

Bending Table Adjusts For Conduit Size

METHOD

To eliminate the stooping which usually accompanies the operation of hydraulic conduit benders set up on the floor, Union Electric Co., Inc., of Richmond, Va., uses a large waist-high bending table. The hydraulic bender is mounted on a platform cut out of the table which may



Do you worry about power distribution costs

WHILE YOU'RE AT LUNCH?

If you're figuring costs of that new power distribution system — either in an old building or that new one you're planning — here's one way to help you keep costs down and assure you of dependable service — specify and use Rockbestos A.V.C. (Asbestos, Varnished Cambric insulated) Interlocked Armored Cable.* Here's how:

- You save important dollars by eliminating the need for costly conduit or ducts.
- It cuts installation time and permits quick, easy repairs.
- Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable.
- It's easily installed on racks or hangers beneath the ceiling or next to walls.
- It can be installed up, down or around walls, beams or posts.

Get all the details on Rockbestos A.V.C. Interlocked Armored Cable. Write now for catalog which gives complete specifications and application data.

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT | NEW YORK, CLEVELAND, DETROIT, CHICAGO, PITTSBURGH, ST. LOUIS, LOS ANGELES, NEW ORLEANS, OAKLAND, SEATTLE

*Single conductors are standard N.E.C. Type AVA power cables.

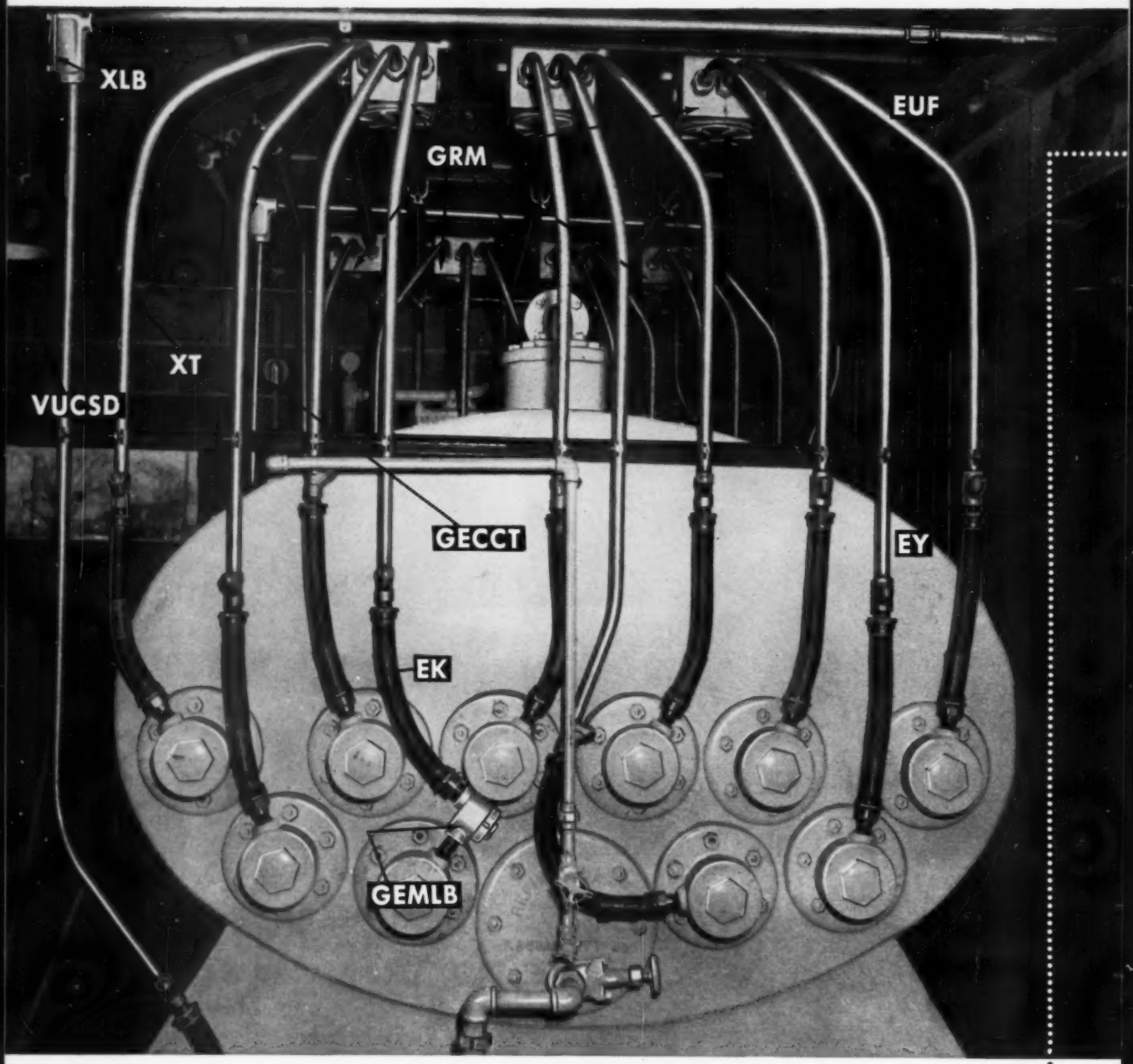
ROCKBESTOS



A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

Oil Treating Plant Specifies



This photo shows one of the Hudson oil treating machines, to which are installed a number of necessary Killark Flexible Couplings. On the ceiling are Killark Explosion Proof Junction Boxes. In the box at the right are enlarged photos of the Killark units used (and numbered) in this installation.

ELECTROLET KILLARK SPEEDOLET

K KILLARK ST. LOUIS

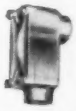
Killark

ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Aves. St. Louis 13, Missouri

KILLARK Explosion-Proof Fittings

Attractive Alumalloy Construction Offers Protection, Strength, Freedom from Rust and Corrosion



XLB Junction Box



XT Junction Fitting



VUCSD Lighting Fixture



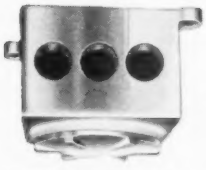
EY Sealing Fitting



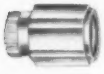
GECCT Junction Box



EK Flexible Coupling



GRM Junction Box



EUF Union



GEMLB Junction Box with Sealing Cover (GEMEY)

The installation shown here is for oil processing equipment at the Hudson Oil Company plant in Kansas City, Kansas. It is significant testimony to the efficient, safe design of Killark Explosion-Proof Fittings that were used throughout the job.

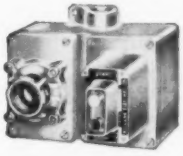
Electrical Contractor—
Great Northern Electric Co., Kansas City, Kansas
Killark Representative—Wm. B. Terry Co., Kansas City, Missouri



GRD Junction Box (with sealing cover)



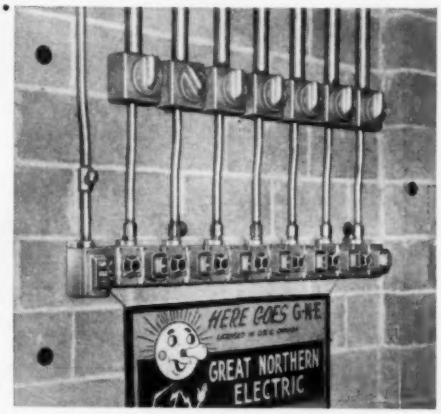
EUM Union



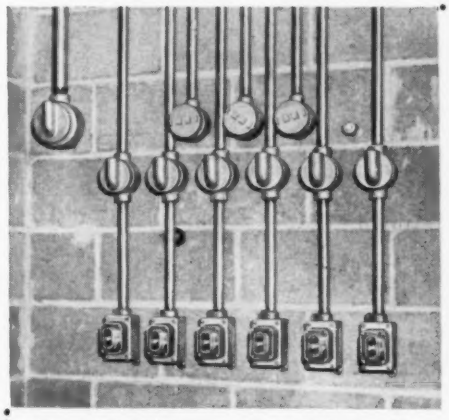
2XPLBM Pilot Light and Push Button Station



EY Sealing Fitting



Battery of push button and pilot light units which operate the oil treating machines. Actual units shown enlarged in the attached inset.





GESLBT with sealing cover



GECLBT Junction Box



GECCT with sealing cover



XPBM Push Button Stations

These "start" and "stop" stations will control operations in other parts of the plant now under construction. Actual units shown enlarged in inset.

Killark Representatives will gladly offer their assistance on design and specifications for your installations.

KILLARK REPRESENTATIVES

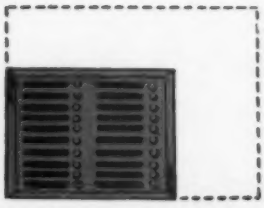
Atlanta 8, Ernest T. Loyd, Inc., 69 Mills St., N. W.
Baltimore 18, Leo T. McCourt Co., 11 West 25th St.
Boston 27, Electrical Agencies, Inc., 49-51 "D" St.
Buffalo, Eberhardt Electric Sales, 278 Johnson St.
Chicago 7, Harry J. Kahn Electric Sales, 1528 W. Adams St.
Cincinnati 37, Arthur L. Ehlers Co., 1031 Meta Drive
Columbus 15, Glenn A. Henry Co., 390-412 McCoy St.
Dallas 2, Geo. E. Anderson Co., 1901 Griffin St.
Denver 4, Kenneth B. Schumann Co., 1073 Galapago St.
Detroit 14, Riecher Electric Sales Co., 8319 Mack Ave.
Kansas City 8, Wm. B. Terry Organization, 616 W. 26th St.
Lincoln, W. C. McConkle, 2467 Park Ave.
Los Angeles 33, Kenneth Anderson Co., 123 So. Myers St.
Milwaukee 2, Martin-Gaertner Sales Inc., 1108 No. Third
Minneapolis 2, Harry P. Smith Co., 826-27 Andrus Bldg.
New York City 33, W. J. Wickenheiser Co., 600 West 181st St., Room 22
Philadelphia 3, Harry G. Anschuetz Co., 2014 Chancellor St.
Phoenix, Kenneth Anderson Co., c/o Mr. Melvin C. Long, 422 S. 7th Ave.
Pittsburgh 9, Crescent Sales Co., Inc., 4830 McKnight Road
San Francisco, F. M. Nicholas Co., 714 Harrison St.
Seattle 4, Northwestern Agencies, Inc., 4130 First Ave., S.

new

MODULAR STAFF IN-AND-OUT REGISTERS

AVAILABLE IN ANY HEIGHT-TO-WIDTH RATIO

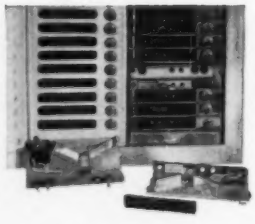




REQUIRE LESS THAN HALF THE SPACE USED BY OTHER REGISTERS

WITHOUT SACRIFICING AREA FOR NAMES

Modular design makes Couch registers available in many name capacities and height-to-width ratios at competitive prices. Flexible grouping of unique plug-in name-tile units requires less than half the space used in other registers — without sacrifice to name area. Name tiles and long life lamps can be quickly changed by simply withdrawing the plug-in unit.



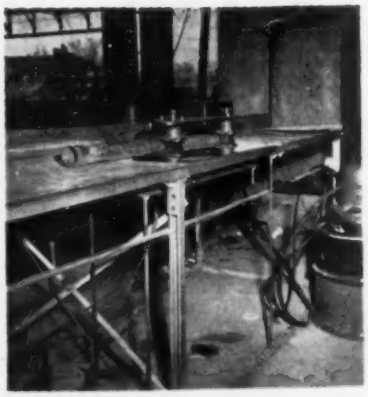
Couch's new modular staff in-and-out registers located at key points instantly indicate which staff members are in the hospital. Just a flip of a switch by a reporting member illuminates his name tile at all register locations, informing hospital personnel of his presence. When leaving the hospital, a switch operated at any register extinguishes his name tile at all registers. For hospitals with message centers, flashing name tiles (message indicators) may be incorporated.

To see how you can have a custom-built register system at standard system cost, write today for Bulletin H9.

Simplified Systems of Communication

S. H. COUCH COMPANY, INC.,
NORTH QUINCY 71, MASS.

Couch



RISING PLATFORM of table on which hydraulic bender is mounted permits accurate bending of all conduit sizes at waist-high level. Nuts for adjusting platform height are visible on threaded rods extending down from platform.

be raised or lowered to bring the horizontal center line of the bending shoe to the proper height above the table for the particular size of conduit to be bent. Thus, the length of conduit always lies flat on the table, and bending pressure is applied along the conduit's center line.

When the size of conduit to be bent differs from the setting, the height of the platform is raised or lowered the proper amount by turning the adjusting nuts below the platform mounting.

Peg Board Plan Rack

STORAGE SPACE

Small sets of electrical plans often present a rather frustrating storage problem. This is particularly true if the plans are "active" sets—jobs in the estimating or actual construction stages which require frequent reference. Normally, such sets consist of one to four sheets. Because of their light weight and small size, they are rather difficult to file in the conventional stick-rack with bulkier sets of drawings. As a result, they may end up as individual rolls in an unsightly stack on or under a convenient table. Only by shuffling through the stack can a specific set be found.

A trim 4-ft by 4-ft peg board solves the problem for R. R. Taylor, general superintendent at Beall, Gibson & Roush Electric, Inc., Kalamazoo, Mich. Taylor has the wood-framed board mounted on a wall near his desk. Adjustable, formed-wire peg board "hooks" support up to a dozen sets of rolled plans.

CRESCENT

INTERLOCKED ARMOR POWER CABLE



GIVES YOU *SPEED* and *ECONOMY* OF INSTALLATION

Crescent Interlocked Armor Cable with ALUMINUM or GALVANIZED STEEL ARMOR provides a flexible metal-enclosed method of wiring for power. Speed and economy of installation are the principal advantages of these cables since they can be placed on easily hung racks or attached to building surfaces. Maximum current carrying capacity is secured by the use of the varnished cambric insulation. For outdoor or damp location installation, it is furnished with SYNTHOL IMPERVIOUS SHEATH between the insulated conductors and armor, as illustrated above.

The Varnished Cambric insulated conductors are thoroughly protected by the Impervious Sheath of tough thermoplastic which is highly resistant to moisture, alkalies, acids and oils. This cable shows attractive savings when strung from messenger cables or in troughs outdoors or between buildings.

Crescent Interlocked Armor Cable also available with butyl rubber insulation.

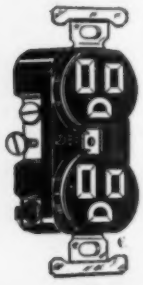
CRESCENT INSULATED WIRE & CABLE CO., TRENTON, N. J.

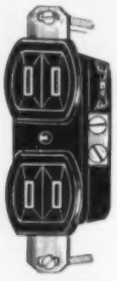
OVER 70 YEARS EXPERIENCE

EAGLE
PERFECTION IS NOT AN ACCIDENT

NEW PRODUCT CATALOG PAGE

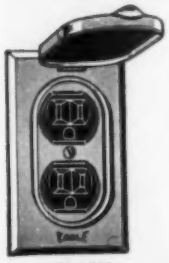
From America's Outstanding Manufacturer of Quality Wiring Devices


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DUPLEX RECEPTACLE

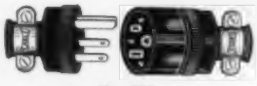

No. 733
No. 736—EARS
DUPLEX
FLUSH RECEPTACLE


No. 230—S.P.
No. 233—3 WAY
20 AMP TOGGLE SWITCHES


No. 241—S.P.
No. 243—3-WAY
SILENT MERCURY
SWITCHES


No. 986
WEATHERPROOF
DUPLEX RECEPTACLE


No. 805
20 AMP—3 WIRE
POLARIZED RECEPTACLE


No. 234
RUBBER CONNECTOR AND CAP



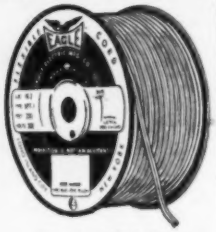
No. 914 DETECTO-LITE ON CARD


No. 292
DOUBLE COIL
BELL 2½"

"Perfection Is Not An Accident" has been the Eagle creed for over 38 years. That is why buyers agree that Eagle's approved and proved line of over 1500 electrical wiring devices and specialties are the best for the money. Specify these Eagle numbers on your next order.


No. 296
DOUBLE COIL BUZZER

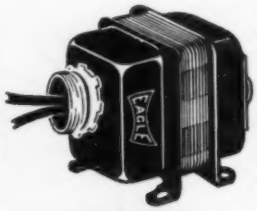
SOLD THRU
WHOLESALERS ONLY.


No. 85—SPT-1 WIRE


EAGALOK
FLUSH
RECEPTACLES
No. 870
10A-2 WIRE
No. 871
No. 871-GR
GROUNDED
10A-3 WIRE




Nos. 33
44
66
BAKELITE WIRE
CONNECTORS


TRANSFORMERS
No. 285—HANDI-MOUNT
No. 287—SURFACE MOUNT

EAGLE ELECTRIC MANUFACTURING CO., INC.
LONG ISLAND CITY 1 • NEW YORK
"Perfection is not an Accident"



PEG BOARD rack for small rolled plans is within easy reach of R. R. Taylor, general superintendent, Beall, Gibson & Roush Electric, Inc., Kalamazoo, Mich. Adjustable "hooks" support sets of "active" plans for quick reference.

Hooks are either 4-in. or 6-in. size and can be relocated at will to accommodate specific rolls.

Project titles are written on the outside of each roll for easy identification. Now, when Mr. Taylor wants to refer to a specific drawing, he merely reaches up and takes down the proper set of plans.

While the peg board rack can be used almost anywhere, it is most effective in small offices. The biggest advantage is that it takes up no flat work space and can effectively replace the bulkier and less efficient "pigeon-hole" rack so often used for small rolled-up drawings.

Safety Interlocks Guard Plant Bridge

CONTROL

A railroad track well can be a formidable obstacle, especially when a loaded fork lift truck weighing 17,000 lbs must get from one side to the other every two minutes. Short of moving the track and filling in the well, you either go over it or under it.

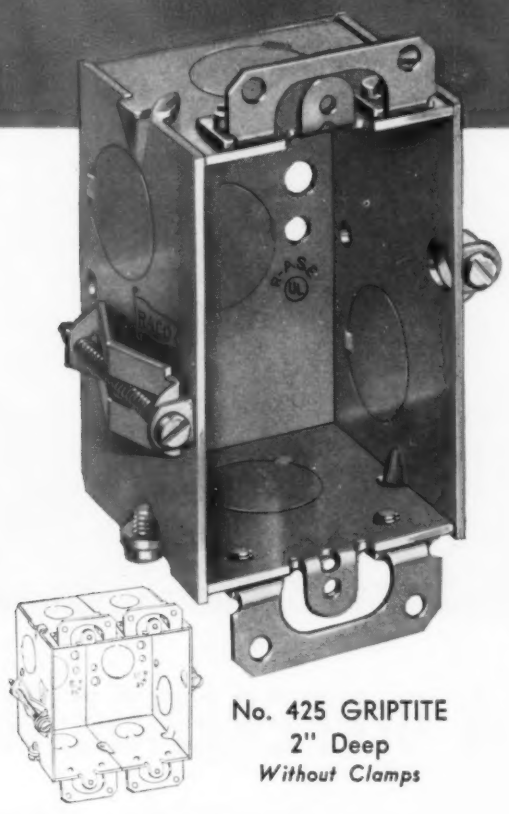
This was the problem recently faced by the New Brunswick, N. J., Delco Battery plant of the Delco-Remy Division of General Motors Corp. when it planned construction of a trailer truck dock in order to expand its shipping facilities.

The solution was a lift bridge which employs a single linkage arm in what is essentially a cantilevered, double counterweighted system. The bridge and its counterweight system represent a mass of approximately 30,000 lbs. As the bridge now operates, it picks up speed until it reaches the half-way (45°) point, and then gradually slows to its lowest speed at the full

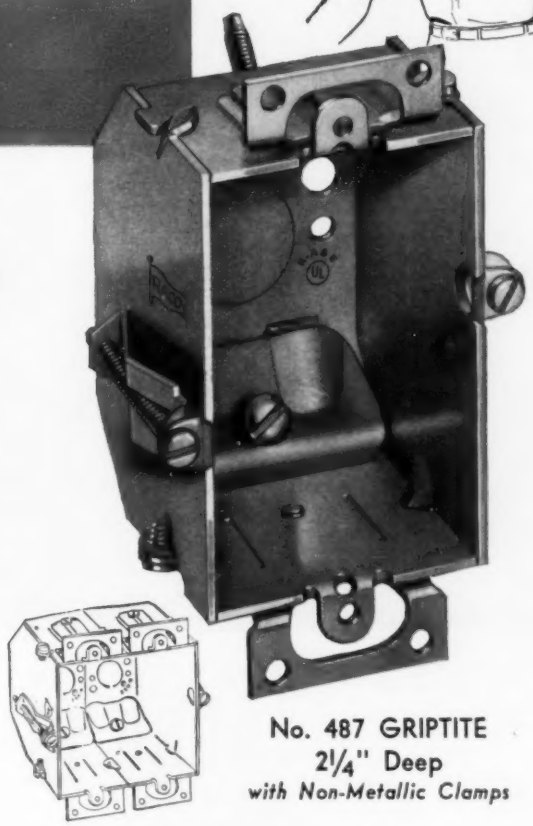
Give Your "Old Work" A Profit Lift with

New RACO GANGABLE GRIPTITE BOXES





No. 425 GRIPTITE
2" Deep
Without Clamps



No. 487 GRIPTITE
2¼" Deep
with Non-Metallic Clamps

- GRIPTITES ARE EASIEST TO INSTALL
- WORK PERFECTLY IN ANY TYPE WALL—WOOD, WALLBOARD, PLASTER, CONCRETE, BRICK
- EXPANSION-ANCHORS FASTEN BOXES SECURELY
- 2-GANG GRIPTITES IDEAL FOR KITCHEN EXHAUST, CENTRAL AIR CONDITIONING SWITCHES

You Can Always Rely on Raco

You get fast installation with Raco gangable Griptite boxes. Make old work installations more profitable. Single or ganged, Raco Griptites anchor securely in any type of wall. Next time make a Raco Griptite installation and show a profit on old work!

ASE RACO **ALL-STEEL EQUIPMENT INC.**
AURORA, ILLINOIS



THERE IS A DIFFERENCE IN

G-E WHITE rigid conduit is manufactured for easier

When you look through a length of G-E WHITE you'll see that its interior surface is uniformly smooth all around, from end to end. This smoothness is one of the qualities that make G-E WHITE rigid conduit different—a conduit quality that gives you easier fishing and wire pulling . . . helps you make speedier installations.

At General Electric, special manufacturing and quality control procedures are responsible for the smooth interior. "Pickling" in acid removes scale and impurities from the untreated conduit. The interior coating is applied evenly throughout the entire length, forming a continuous barrier against corrosion. This coating is specially formulated to provide a low-friction, corrosion-resistant interior that cuts down wire-pulling effort.

EASY BENDING IS ANOTHER DIFFERENCE

G-E WHITE bends right, too — smooth, true, and even. That's because G-E WHITE is galvanized by *metallizing*, a process that eliminates the excessive heat and the subsequent quenching and straightening which tend to work-harden ordinary conduit.

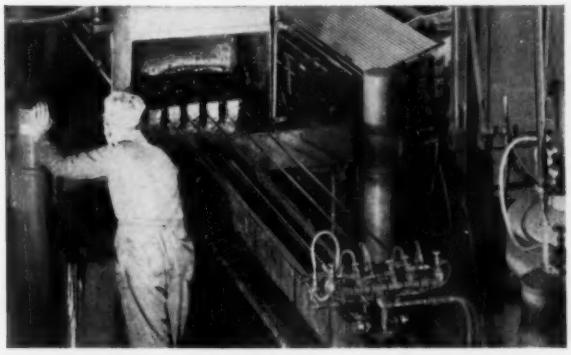
Your General Electric distributor stocks an ample supply of G-E WHITE to meet your requirements. Ask him for detailed



EVERY LENGTH OF G-E WHITE is carefully checked for interior cleanliness and uniform smoothness. This strict quality control gives easy fishing and wire-pulling through every length.



"PICKLING" IN SULFURIC ACID removes all the brittle scale and any impurities from the reamed and threaded conduit. The result is a chemically clean interior and exterior.



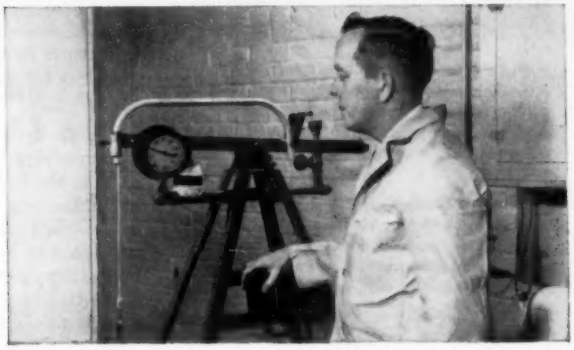
SPRAYING THE CONDUIT INTERIOR with a specially formulated Glyptal* coating provides a pliable finish that won't chip or crack even during bending. This low-friction coating helps make wire-pulling an easier job.

CONDUIT

fishing and wire-pulling

information or write for literature to Section C72-318, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

**Registered Trade-mark General Electric Company*



LABORATORY PULL TESTER proves that G-E WHITE offers 14% easier wire-pulling than ordinary conduit. Here, an inspector tests a ½"-diameter, 3-ft length with two 90-degree bends, for continuous pull.

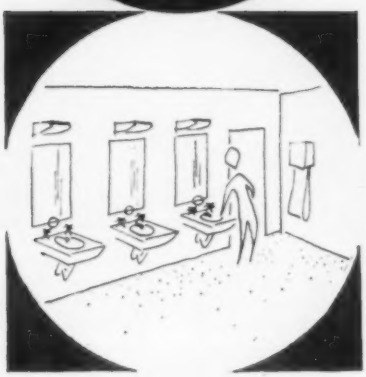
Progress Is Our Most Important Product

GENERAL ELECTRIC

new

lighting design by mc Philben





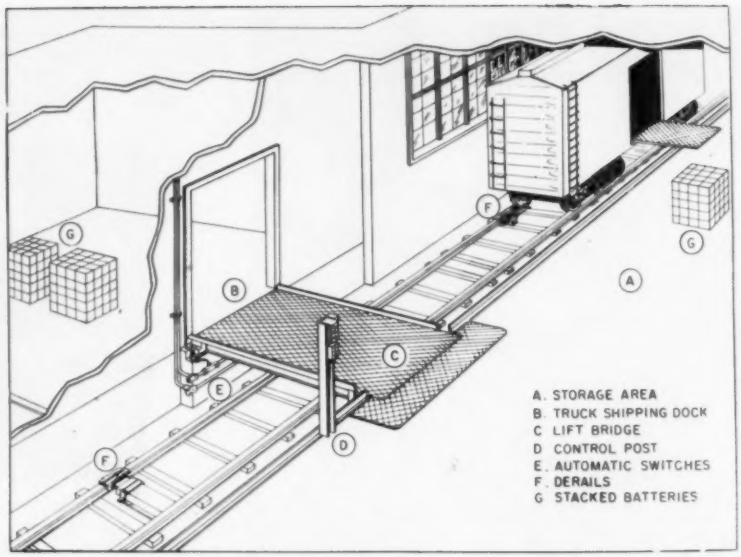
mcPhilben's new 37-60 line designed by E. Allan Rothman provides the most efficient lighting of fitting rooms, mirrors, stair landings, telephone bookstands . . . wherever localized illumination is desirable.

Available in both fluorescent and incandescent models offering these exclusive features: continuously hinged doors for easy relamping . . . all metal construction . . . baked on grey enamel finish . . . removable reflectors for easy access to electrical components.

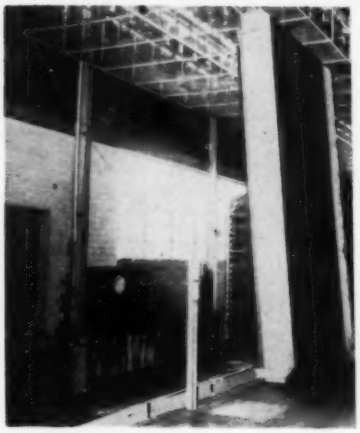
37-60 Two 60 watt lamps
37-65 Two 15 watt T-8 fluorescent lamps

Contact your mcPhilben representative for full details. See our insert in Sweet's file 32a/mc or write for data sheet C/27

mc Philben
LIGHTING COMPANY
1329 Willoughby Avenue, Brooklyn 37, New York



DRAWING clearly shows positioning of bridge in relation to storage area, track well and truck shipping dock.



TRACK WELL LIFT bridge in up position. Post with all centralized controls is in center foreground. Overhead sliding door to truck shipping dock is in closed position at left.

down or up position. Special linkage provides for this deceleration, so that the bridge comes gently to a halt. It is always under carefully interlocked safety control. A single post in the storage area holds the necessary operating switches.

At the beginning of the day the bridge is customarily found in the "Up" position. Delco plans as much as possible to make its railroad drills during the night. To lower the bridge, the operator simply unlocks a stop button and pushes the button marked "Lower".

A vibrating horn blows and overhead red blinker lights in both the storage area and the shipping dock go on. They continue for 20 seconds to give personnel in the vicinity ample warning. The 3-hp motor which operates the bridge will not start until the conclusion of this 20-second period.

During the 20-second lapse, special derails on the rail siding on both sides of the bridge, operated by air cylinder under solenoid control, move into position. These prevent freight cars from plowing accidentally into the bridge when it is down. Each derail and air cylinder is mounted on a common structural base for easy attachment to the base of the rail and both components are housed together in sheet metal.

Fool-proof safety features with all operations concerning the bridge were necessary because, as G. P. Dick, Plant Manager, stated: "The bridge is the only means of access to the new shipping dock and any damage done to it would seriously interfere with shipping."

A unique safety feature to further prevent the possibility of a freight car damaging the bridge are three hydra-tubes running the length of the underside of the bridge. The slightest contact by these hydraulically operated switches with an obstruction under the bridge causes the bridge to stop, reverse itself and start back up. They are automatically energized by the downward movement of the bridge.

When the bridge reaches full "Down" position, locking latches close, and a lock-stop switch is automatically energized which trips two down-limit switches. One of these shuts off the main drive motor and the other allows the overhead door to the shipping dock to be opened.



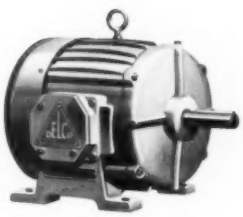
DELCO DOUBLE CHECKS THE FIT

Bearings and housings are measured and color-coded for selective fit

After bearings and housings for Delco Electric Motors are machined to precise tolerances, both are re-measured and selectively mated for closest fit. Then, to complete the marriage, color-coding is used to mark perfect pairs. Result: accurate alignment and extra long wear . . . added value that saves you money.

Such thoroughness and care are evident at every step of building Delco Electric Motors as well as in the generous use of quality materials. Take Delcote insulation, for instance. This Delco exclusive for integral horsepower motors is the sure defense against dirt, vibration, moisture and abrasion.

Consider all the extras in Delco Electric Motors and you'll know why it pays to contact your Delco Products Distributor or Sales Office for the correct solution to any motor problem.



Delco Electric Motors, precision-built from end to end, are available in a wide range of sizes and styles to 200 h.p.

GM GENERAL MOTORS DELCO

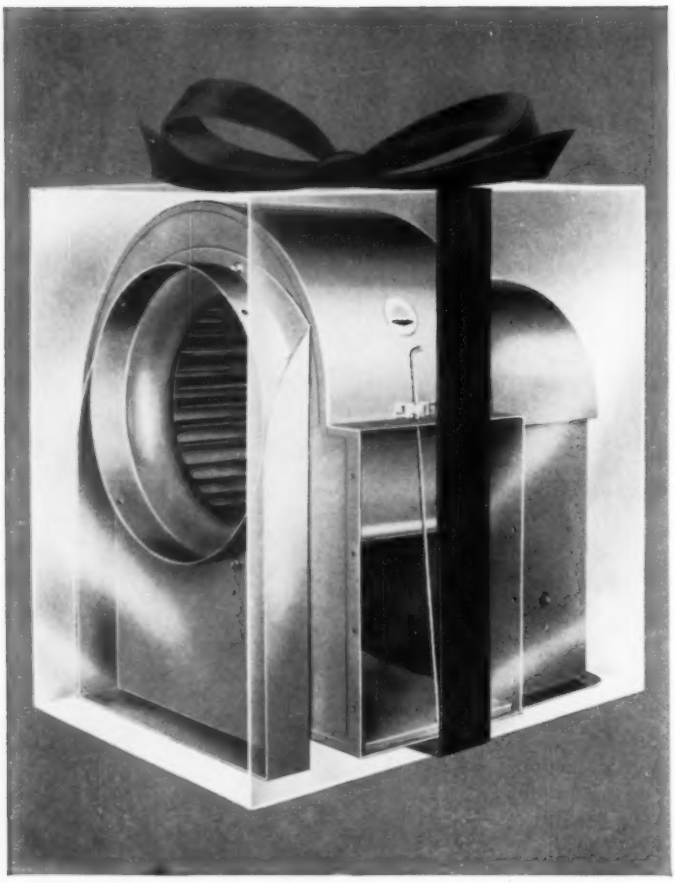
DELCO MOTORS

Delco Products,
Division of General Motors, Dayton, Ohio

- APPLIANCE MOTORS • INDUSTRIAL MOTORS
- GENERATORS • ACTUATORS
- AUTOMOTIVE AND HYDRAULIC EQUIPMENT
- HERMETIC MOTORS AND CONTROLS
- RESIDENTIAL GARAGE DOOR OPERATORS
- AIR SUSPENSION COMPONENTS

GM

"PACKAGED" VENTILATION



—another example of how you benefit when you install American Blower ventilating equipment

Sell true, economical "packaged" ventilation—complete and ready to use—in the full line of American Blower Utility Sets.

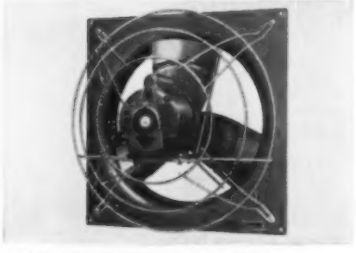
Self-contained utility sets are assembled at the factory . . . ready for fast, easy installation. And check their other important benefits for your customers:

- **Pre-engineered** — Buyers can compute volume of space to be ventilated . . . just pick proper fan from catalog.
- **Certified Ratings** — Air deliveries meet rigid standard test codes.
- **Available locally** — You give "off-the-shelf" delivery on most models . . . just call the American Blower distributor.

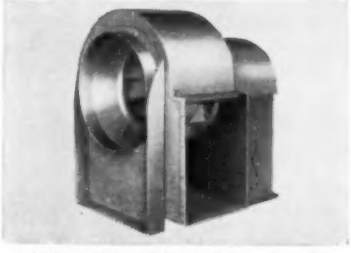
Want more profits? Sell the *complete* line of American Blower fans for every ventilating job. Want sales help? Offer your customers equipment selection assistance from one of our 73 branch offices. For full information, write today: American-Standard,* American Blower Division, Detroit 32, Mich. In Canada: Canadian Sirocco products, Windsor, Ontario.



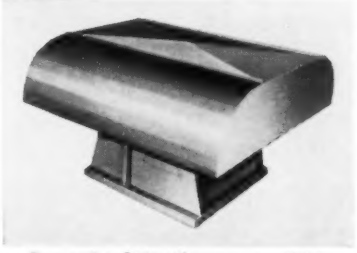
It pays to standardize on American Blower!



Ventura Fans — quiet, efficient, economical. Sizes from 10" to 30".



Utility Sets — Direct drive, sizes 3" to 12¼"; V-belt drive, 9" to 36".



Power Roof Ventilators — available through American Blower branches.

*American-Standard and Standard ® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
AMERICAN BLOWER DIVISION

Button controls to open this shipping dock entrance port are located both in the shipping dock itself and on the control post in the storage house. The set in the shipping dock, which will not work if the bridge is not down, enable shipping personnel to close the overhead port when they open large loading doors for the trucks. This minimizes the rush of cold air into the plant proper when the door is opened.

This entrance door to the shipping dock, which looks directly out over the railway track well, cannot be opened unless the bridge is down, and, by the same token, the bridge cannot go back up unless this door is closed. The automatic locking latches prevent the bridge from any possibility of accidentally rising while in use.

Raising the bridge is basically a reversal of the lowering process. First, the door to the shipping dock is closed by pushing a button. Only when this door is fully closed is the switch energized which will permit the bridge to be raised.

Then, after releasing the stop button, the raise button on the post in the storage area is pushed and the series of safety devices react and cycle out. Again the claxon blows and the blinker lights go on for the 20-second warning period before the bridge rises.

After this safety period, the latch solenoid opens the locking latches. If these latches fail to open, no contact is made at the latch limit switch, and the main drive motor will not start. Thus, there is no possibility of stripping the gears on the motor.

When the time delay relay has run its cycle and the latch limit switch is energized, the bridge begins to raise. Upon reaching its fully raised position, there is double protection to stop its movement in the form of two up limit switches.

Up limit switch No. 1, when tripped, shuts off the motor. If, however, this switch fails to operate, the bridge will automatically trip switch No. 2 to stop the motor. Whenever this second switch might be called into operation, a special red warning light on the control post goes on to indicate that switch No. 1 is in need of repair.

The derails trip off the railway siding only after the up limit has been reached. The bridge automatically locks in the up position. The stop button on the controls is then locked with a lock and key to prevent unauthorized personnel from pushing the buttons and using the bridge.

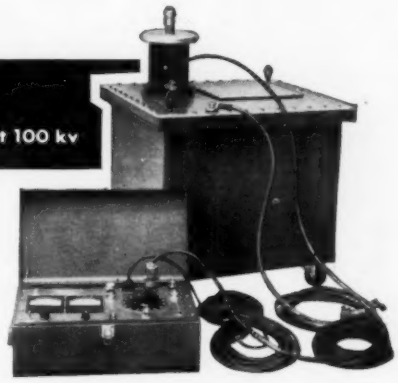
BIDDLE DIELECTRIC TEST EQUIPMENT

. . . for measuring direct current at voltages up to 100 kv when applied to the insulation of generators, transformers, bushings, cable, etc.

New

MODEL 2

current output 6 ma continuous at 100 kv



More and more engineers are leaning to d-c testing with voltages equal to or somewhat greater than equivalent peak alternating voltages. Their experience and increased knowledge and appreciation of the advantages of testing with direct voltage have accelerated the need for test equipment to meet field requirements.

IMPORTANT FEATURES

- Well-designed provisions for utmost safety
- Simple operation and reliable performance
- Excellent output voltage regulation
- Compact, mobile design
- Facilities for voltage and leakage current measurements

IMPORTANT APPLICATIONS

. . . *in development* . . . for testing the d-c dielectric strength of insulating materials and the adequacy of the electric design of insulation in any type of electrical equipment.

. . . *in production* . . . for non-destructively detecting defects in the insulation of electrical equipment due to design, material, and workmanship.

New

MODEL 1-A

3 ma continuous at 40 kv



. . . *in maintenance* . . . for non-destructively detecting unreliable condition of insulation of new or repaired electrical equipment. Preventive maintenance tests on important rotating equipment, cable, switchgear, etc., result in appreciable savings.

For important details regarding these units and information on the subject of high voltage d-c testing *write for our New Bulletin 22-ECM.*

B-800

JAMES G. BIDDLE CO.

1316 ARCH STREET • PHILADELPHIA 7, PA.

ELECTRICAL TESTING INSTRUMENTS • SPEED MEASURING INSTRUMENTS
LABORATORY & SCIENTIFIC EQUIPMENT

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Please send me
BULLETIN 22-ECM

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City_____ Zone____ State____

ASTRONOMIC
TORK
time switches



ON at Sunset — OFF at Sunrise . . .
YEAR IN . . . YEAR OUT WITHOUT ATTENTION

1. Provide Maximum PERFORMANCE

Timing from 40 below zero to 150 above. 35 ampere incandescent lamp load rating—All parts nickel-plated for extra long life.

2. CONVENIENCE

Continual resetting of ON time unnecessary. OFF setting easily changed from 10:30 P.M. to 1:30 A.M. or sunrise, without removing dial . . . no tools required.

Completely mechanical—install wherever convenient.

Lug terminals take up to #6 wire without bending.

3. ECONOMY

Save electricity—lighting will not come ON until needed. Labor saving too.

The Tork Astronomic is available in SP, DP, 3P, SPDT DPDT, 2 Circuit, and Momentary contact—with or without our special Skip-A-Day feature.

TORK TIME CONTROLS, INC.

WRITE NOW . . . for details on complete line.

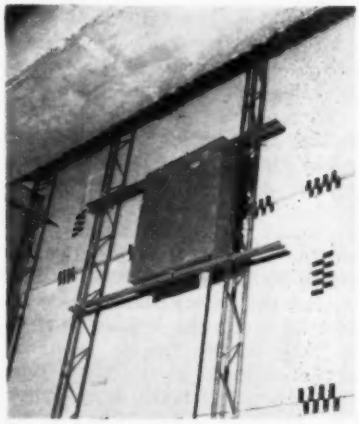
DEPT. Z1, MT. VERNON, N. Y.

Mounting Outlet Boxes To Metal Frame Studding

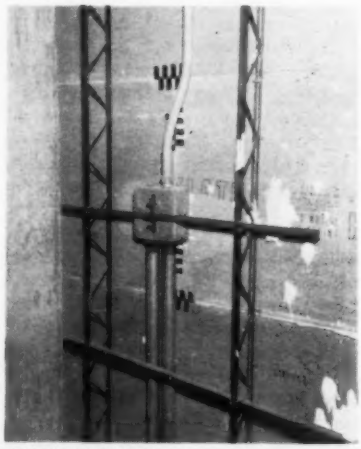
WIRING

That the alert electrical contractor keeps abreast of new building design and construction techniques was evident at the Niles Township High School being completed west of Evanston, Ill. Here, Hoffman Electric Co., Chicago, project electrical contractor, encountered truss-frame metal studding with clip-on plaster board instead of conventional studding and metal lath. Plaster applied to the face of the board forms the finished surface of the classroom walls. All electrical outlets are flush type, meaning they had to be installed between studs.

An effective method of rigidly supporting outlets was devised by



DUAL BRACKET supports classroom intercom speaker box between truss-frame metal studding. Top and bottom channels are saddle-clamped to box and wire-tied to vertical members.



BACK MOUNTED bar supports switch outlet between truss-frame metal studs. Note clamp-on plaster board. Corridor area was later enclosed with rows of flush metal lockers.

Used by MORE CONTRACTORS than any other brand- BY MILLIONS EVERY YEAR!

Some surveys have shown IDEAL Connectors first choice by up to *5 to 1* over the next leading brand. *Maybe so!* The important fact — proved by continuing surveys — is that contractors just plain like IDEAL Connectors *better*, for *more* jobs than any other brand — by millions! They know they can depend on them to perform as promised.

In short, these contractors KNOW QUALITY — WANT QUALITY — and BUY QUALITY.

If you aren't using IDEAL Connectors, you're in a minority. *Better check your reasons* — or join the switch to America's top brand of Wire Connectors — IDEAL.

IDEAL

WIRE CONNECTORS



IDEAL Wire-Nuts® CONNECTORS

the lifetime-tight, wire crushing grip that NEVER LET'S GO!



- just screw them on — like a nut on a bolt!

Use new "Wire-Nut" wrench if you like.

Screw-and-lever and wedge action with FORCE OF UP TO 2½ TONS flattens wires and multiplies contact area

NOW — BETTER THAN EVER

Stronger!
Closer tolerances!
Easier to Use!

SHAKE-PROOF! PULL-PROOF!
FLASH-PROOF! HEAT-UP PROOF!

IDEAL CRIMP CONNECTORS with the UNIQUE "Wrap-Cap" (Patented) INSULATOR



A stronger crimp sleeve of cadmium plated steel, diaper-wrapped in perfect, pre-fabricated insulation all-around and double protected over wire ends. Best of the crimp connectors!

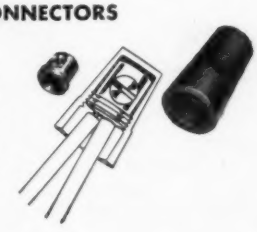
LISTED UNDER RECOGNITION SERVICE — UL — UNDERWRITERS LABORATORIES INC.

All IDEAL Wire Connectors in all contractor sizes are UL listed as pressure cable connectors, for general use (600 V.) in branch circuit and fixture wiring.

SOLD THROUGH AMERICA'S LEADING DISTRIBUTORS
In Canada: Irving Smith, Ltd., Montreal

IDEAL SET-SCREW CONNECTORS

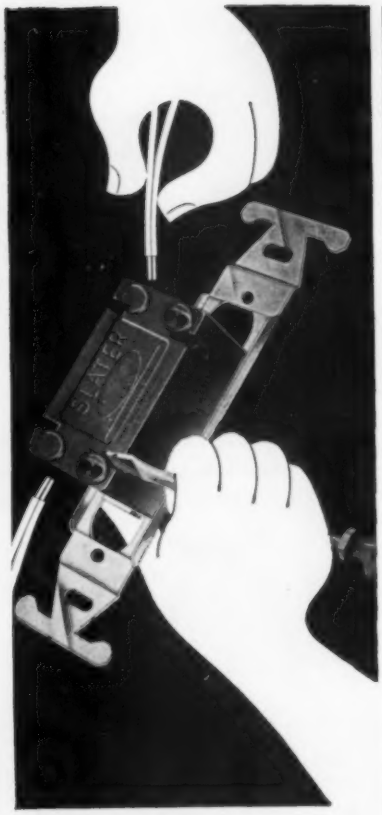
Set 'em and see 'em! A screw driver's all you need. Permits visual inspection of every joint. A breeze to re-use when making circuit changes. *Solid brass* sleeve and set-screw — long-skirt, *highest dielectric* shell.



IDEAL INDUSTRIES, Inc.
1041-C Park Avenue, Sycamore, Ill.
Please send full catalog data on

☐ IDEAL "WIRE-NUTS" ☐ IDEAL CRIMP CONNECTORS
☐ IDEAL SET-SCREW CONNECTORS

Name_____
Company_____
Address_____
City_____ Zone_____ State_____



MODEL 600 QUIET SWITCH

seconds to wire

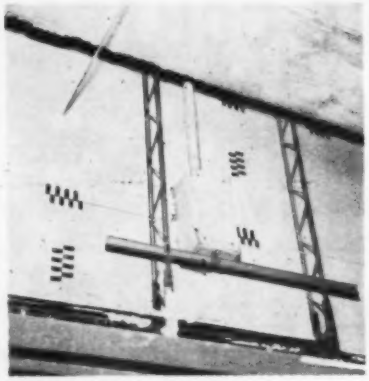
One-Hand Split-Second Wire Release Without Special Tools *

THE SLATER #600 push-wire switch installs 2 minutes faster than screw terminal types. That means *more profit!* Patented side release leaves wire straight, clean, ready to rewire.

ASK YOUR WHOLESALER FOR SLATER... OR WRITE THE PLANT FOR DETAILS ON THE SLATER #600 QUIET SWITCH.

* PAT. 2,795,677

Slater
Lifetime Wiring Devices
SEA CLIFF AVENUE • GLEN COVE, NEW YORK
ORIOLE 6-1100



SINGLE BAR saddle-clamped to bottom of deep box over door. Channel support is fastened to metal studs with tie-wire. Plaster of face of clamp-on board is finished wall of classroom.

Hoffman's project superintendent Harold Baeuchler. He selected small steel channel as the box supporting medium and cut the brackets long enough to bridge and overlap two adjacent metal studs. Boxes are mounted to the channel with bolted saddle-clamps. Brackets are installed inside the truss-frame and securely wired to the vertical members. One or more brackets are used on the top, bottom or back of each box depending upon the size, depth and location of the enclosure.

At the start of the project, superintendent Baeuchler made a sample mockup of a metal stub wall showing typical supporting techniques for a number of outlet boxes. This was kept in the field shop as a demonstration, training and practice "tool" for mechanics unfamiliar with this type of construction. After a few practice rounds on the mockup, these men were ready to face any box installation problem encountered in the new building.

The same mounting method proved quite handy and economical for a variety of temporary switches spotted throughout the school building. For this application, wood supports were usually tied to the steel studs. Need for the usual cumbersome free-standing pedestals or temporary switch racks was eliminated.

Phone Recorder Keeps Calls on Tap

COMMUNICATION

Discouraged at apparently inefficient operation of a commercial phone answering service, Chester Cornish, electrical contractor of Huntington, N. Y., arranged with the local telephone company for the use of a portable phone recorder.

Typical of many contractors with an office in his home, Cornish has constant need of some method of receiving phone calls from clients while he is out on the job. Frequent negative reports from the answering service coupled with complaints from customers that he was not returning their calls prompted him to make the change.

The new unit goes into action each time the phone rings. A previously recorded message answers the caller, asking that he give his name and phone number. The party has 30 seconds in which to give this information plus any other comments, which are recorded on a cylinder. The line is then disconnected, and the unit is set for the next message. The cylinder has space for 12 30-second messages. A dial rotates with each call, indicating the number of messages recorded.

At the end of the day (or at lunch time) Cornish picks up the phone, sets the machine for "play back", and writes down the recorded information. It may be played back any number of times. When all the information has been taken down, the dial is reset to zero for the next day's operation; previous messages are erased as new calls come in. The initial message which responds to the ring may be changed at any time simply by setting the control to "Record" and speaking into the mouthpiece of the phone.

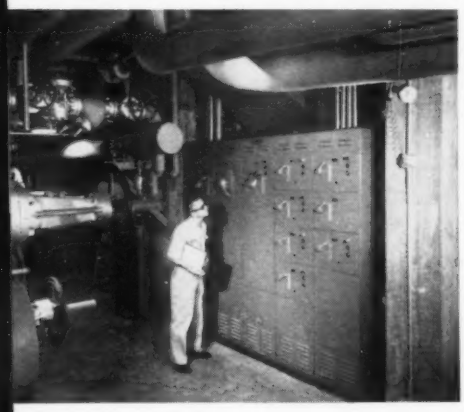
Cornish has found that, at less cost per month than for the answering service, the unit pays off in fewer disgruntled clients.



CUSTOMERS of Chester Cornish, electrical contractor of Huntington, N. Y., leave a recorded message when he is not in the office to answer their telephone call. This portable phone recorder stores the messages until he returns, when they are played back and written down.

Cardinal Glennon Memorial Hospital for Children, St. Louis, Mo., occupies 4½ acres, employed 4,000,000 man-hours of labor in a three-year construction period.

One of two Westinghouse motor control centers with Type B wiring installed in hospital. Each starter has 480- to 110-volt individual control transformer for controlled circuit. J-94111-1



Fail-proof electrical system for children's hospital supplied by Westinghouse

YOU CAN BE SURE...IF IT'S Westinghouse

All-Westinghouse electrical distribution system was unanimous choice for long-term service

J-94111-2





Hospital conference room scene includes Norman H. Maas, Electrical Engineer for Maguolo and Quick, Architect; Joseph F. Dwyer, Manager of Hospital's Central Office and Coordinator of Building Committee; Sister Mary Vivian, S.S.M., Director of Occupational Therapy; Louis S. Sachs, S. C. Sachs Co., Inc., Electrical Contractor; (standing) W. L. Phiffer, Westinghouse Construction Sales Engineer; Paul Olschner, Westinghouse Area Sales Manager; and Walter R. Riechman, Westinghouse Electric Supply Co.

Selection of all-Westinghouse equipment for the electrical distribution system of the Cardinal Glennon Memorial Hospital for Children was made only after the many exacting requirements for hospital service were established and analyzed. The success with which the requirements are being met is shown in the quotes which follow:

The hospital manager reports, "During the 1½ years we have been in operation, the electrical distribution system has required no maintenance other than a periodic check by Westinghouse engineers. Inasmuch as this equipment was furnished by one manufacturer, we have the advantage of undivided responsibility along with a minimum parts inventory stock."

The electrical contractor adds, "The extensive cooperation by Westinghouse in scheduling shipments and in arranging larger shipments to facilitate handling provided us with the optimum flexibility we needed for the three-year construction period."

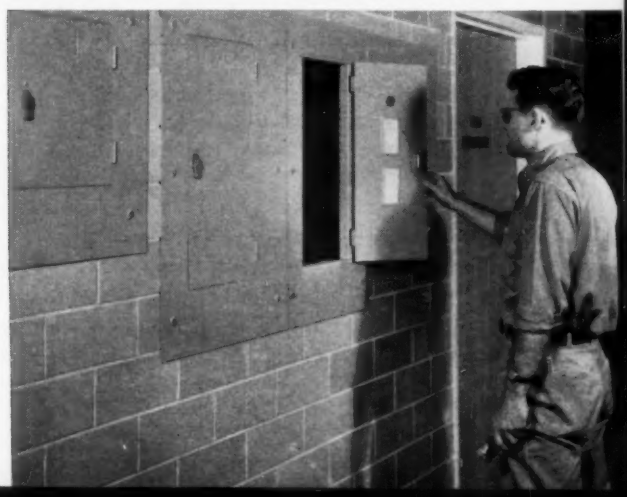
(continued)

YOU CAN BE SURE...IF IT'S Westinghouse



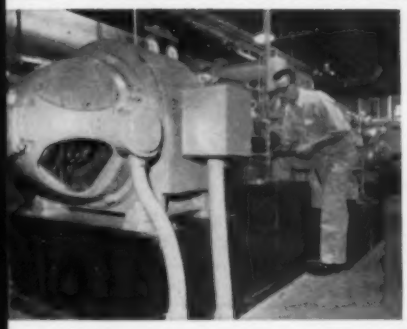
Engineers and contractors discuss Westinghouse metal-clad 5-kv indoor switchgear employing preferred-emergency incoming line transfer arrangement.

Westinghouse Type NLAB Quicklag® breaker lighting panelboards. A total of 42 lighting panelboards and 10 power distribution panelboards are installed in hospital.



Transformer room close-up shows three of hospital's five Westinghouse dry-type self-contained power centers. 75-kva 208-volt wye to 120-volt delta ungrounded insulating power center is in foreground, and two 225-kva power centers are at rear.

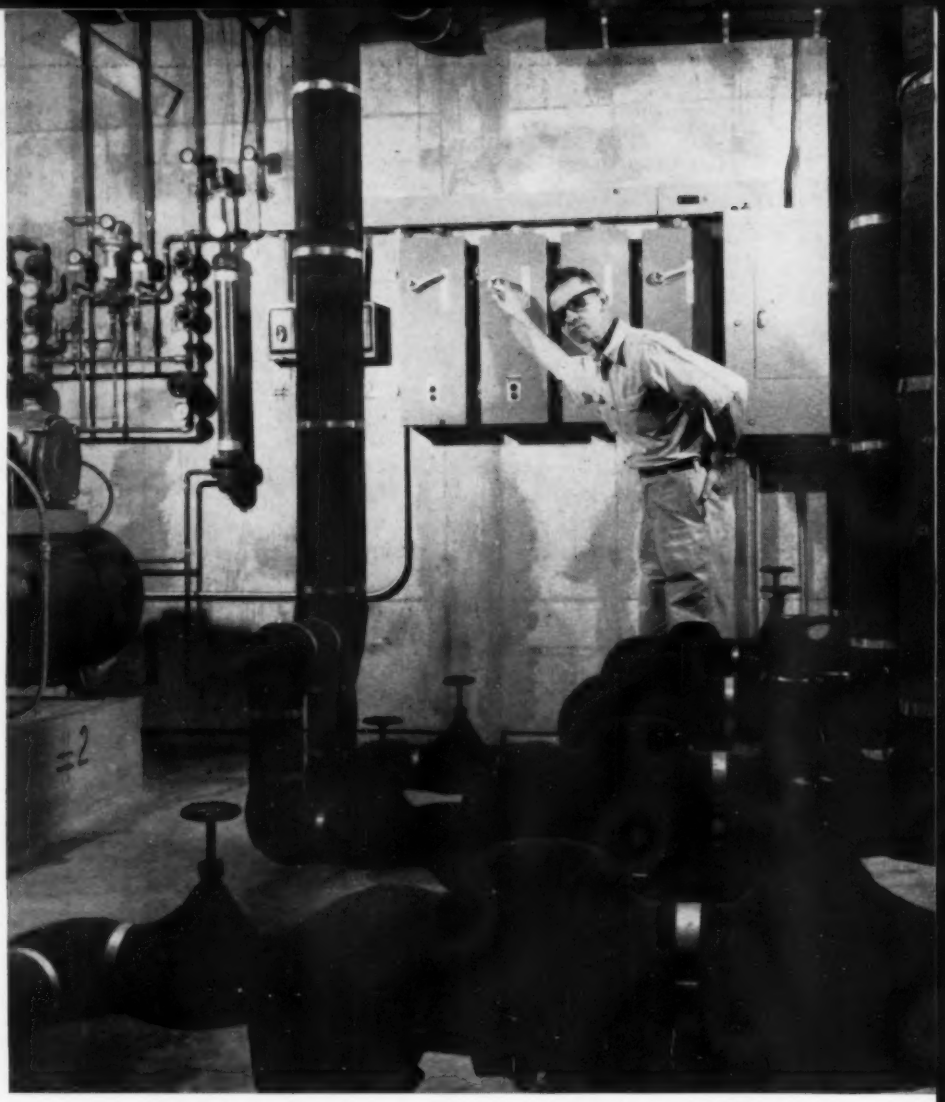
J-94111-3



View of components in air conditioning compressor hook-up. In foreground is a Westinghouse 250-hp wound-rotor induction motor with Type SU double-helical-type speed increaser—1760 to 6750 rpm.



The Cardinal Glennon Memorial Hospital cares for children between the ages of one to twelve, regardless of race, color or creed.



Individual protection of vacuum pumps is provided by Westinghouse Class 11-204, Size 1 starters in NEMA 1 enclosures.

All-Westinghouse system unanimous choice for long-term service *(continued)*

The architect-engineering firm, reviewing the design and engineering which went into the hospital, says, "Our design criteria for the building was established at 100 years, and we selected all material and equipment on that basis. Because of the critical demand for absolute reliability on the electrical system in a hospital of this type, our first consideration was the duplicate primary service, with each 5000-volt feeder from a separate substation as a power failure safety factor. Our past experience with Westinghouse in working out this particular kind of transfer system in conjunction with their application engineers gave us the proved dependability we needed."

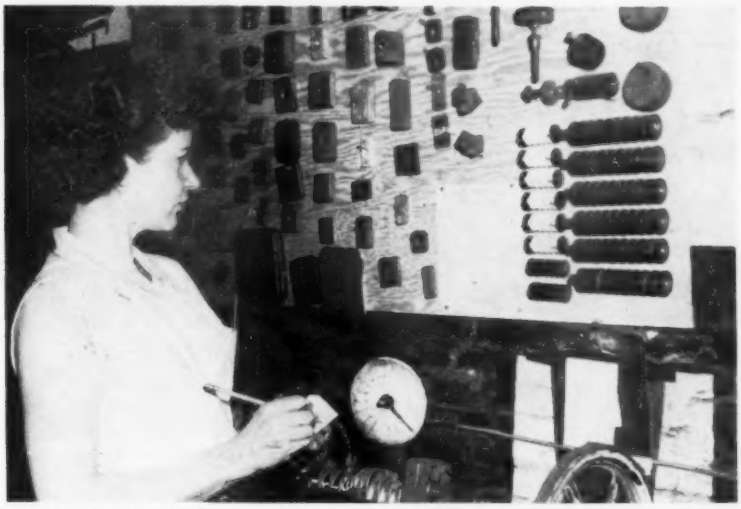
Details of some of the Westinghouse equipment used in the Cardinal Glennon Hospital are illustrated on these pages. Additional information about how Westinghouse helped meet the electrical needs of this hospital is available. Information is also offered in helping you solve your own electrical requirements. See the Westinghouse electrical construction engineer nearest you or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

Cardinal Glennon Memorial Hospital for Children
Architect-Engineer: Maguolo and Quick
Electrical Contractor: S. C. Sachs Company, Inc.
General Contractor: John B. Gutman Construction Company
Westinghouse Distributor: Westinghouse Electric Supply Company

J-94111-4

YOU CAN BE SURE...IF IT'S Westinghouse

Over 250 Pages
Westinghouse Data
in Sweet's Construction File



POPULAR COIL SIZES are listed on an "advance winding chart" so that winders can check the estimated demand, make up the coils in advance as slack periods permit, smooth out their work load and keep a stock of standard coils for faster shop servicing of motors brought in for repair.

Coil Winding Chart Speeds Motor Rewinds

In many shops, such as the Penn Electric Motor Company of Philadelphia, motors brought in for repair reveal considerable standardization, with various types and sizes being repeatedly involved in similar operations. Coil windings, therefore, reflect this "popularity" trend, and the expected demand for coils of given dimensions and characteristics can be predicted fairly close.

The most popular windings have therefore been listed on what they call an "advance coil-winding chart" and these coils can be made up in advance during slack periods so that, when a motor comes into the shop, coils are available immediately. Of course, under normal conditions, the required number of coils are promptly wound and replaced in stock, so the availability remains undisturbed. This method speeds motor winding time, serves to smooth out "hills and valleys" in the work-load of the winding department, and keeps employees constantly employed at a fairly-even pace.



WELDING JOBS performed in the repair shop of the Industrial Electric Company, York, Pa., are carried on with the aid of such safety precautions as a shielding mask, large-capacity exhaust hood and fan, and good local fluorescent lighting.

Notch In Spray Booth Roof Admits Hoist Chain

Spray painting of motors repaired by the Industrial Electric Company of York, Pa., is carried on in a 6-by-7-ft concrete-block section of the shop, this enclosure also being fitted with bi-parting Dutch steel fire doors and an exhaust fan in the outer wall. To permit motors to be carried directly into this enclosure by means of an overhead chain hoist, the roof of the enclosure is notched, as indicated in the accompanying photo. While the width of the notch precludes complete sealing of the enclosure, the action of the high-capacity exhaust fan eliminates fumes so efficiently that no noticeable odor or paint vapor rises through the roof opening.



CHAIN HOIST supported by overhead monorail carries motors directly into this spray booth; the notched roof of the enclosure permitting the vertical chain to move slightly past the mid-point of the booth.

Movable Vise Is Handy Shop Accessory

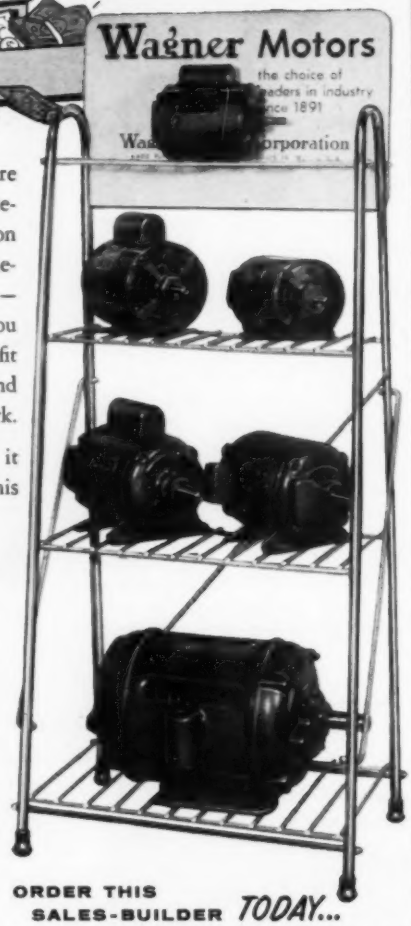
By mounting a vise on a separate steel moving stand which can be shifted around the shop as necessary, mechanics with Electric Motor Service, Kennett Square, Pa., do not have to remove work from their fixed bench vise if a second gripping operation becomes

Here's a PROFIT TIP for motor repair shops



With labor costs skyrocketing, there never was a better time to push replacement motors. You make pure profit on every sale. You give customers over-the-counter service with Wagner Motors—"the choice of leaders in industry." You remove any doubt about making a profit on repairing a badly worn motor. And you save time for other repair work.

Here's the sales-builder that makes it easy for you to take advantage of this source of profitable business...



WAGNER MOTOR MERCHANDISER

HERE'S WHAT IT IS!

- An attractive 4-tier display stand... sturdy, compact, convenient
- Chrome and cadmium-plated for bright beauty
- Eye-appealing 3-color sign at top gives point-of-sale impact to Wagner's advertising program

HERE'S WHAT IT DOES!

- Puts an assortment of motors in full view and easy access of your customers
- Provides big display space in less than 2 square feet of floor space
- Boosts profits by helping your customers sell themselves

ORDER THIS SALES-BUILDER *TODAY...*

You can get the Wagner Motor Merchandiser for just $9.95 with an order of any 10 Wagner Motors in one lot. Jet pump motors may be included. Contact your Wagner branch now... stock up on the profit-packed line of Wagner Motors... and add this merchandiser to your sales team.

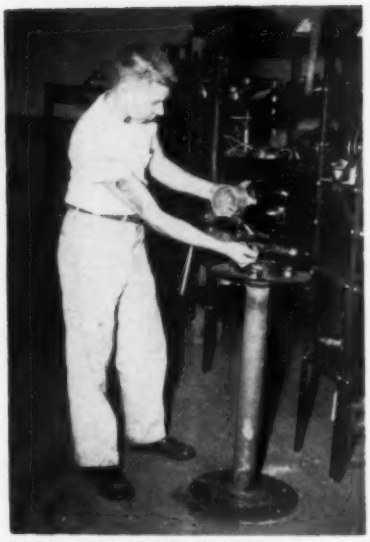
WAGNER ELECTRIC CORPORATION
6413 Plymouth Ave., St. Louis 14, Mo., U. S. A.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

MOTORS • BEARINGS • STANDARD ROTORS
BRUSHES • CAPACITORS • COMMUTATORS

WRSB-2

OVER 850 AUTHORIZED SERVICE STATIONS OR PARTS DISTRIBUTORS



UPPER AND LOWER PLATES are secured to separate pipes by means of standard collars, the diameter of the upper pipe being sufficiently larger than the lower section to permit it to slip over the base standard and thereby permit rotation of the vise.

an auxiliary operation. These movable vises are mounted atop pipe standards, they may be rotated and locked in any position, and they are stabilized by means of a heavy steel circular base plate. The rotation feature is obtained by securing the upper plate to a 4-in. tube and the lower base plate to a tube of smaller diameter so that the one tube fits inside the other.

Wire Stripper Driven By Fractional Motor

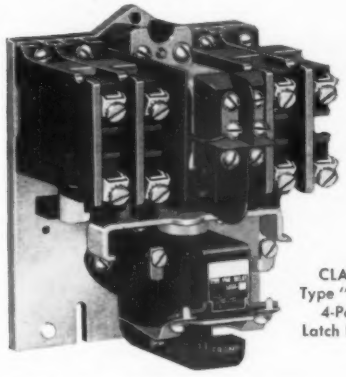
Two spindles, each with a wire brush secured at one end and a sheave at the other, are driven in opposite directions by a quarter-horse motor which is fitted with two pulleys on its main shaft. Reverse rotation of the spindles is obtained through belt action, inasmuch as one of the drive belts is twisted into a figure-8 as it passes between and around the related pulleys on the motor shaft and on one of the brush spindles.

Spindles are mounted in a vertical position, with the corresponding spindle bearings positioned on one side of a baseboard and with the fractional drive motor mounted on the opposite side of the base. This complete assembly is bolted to a channel which, in turn, is clamped to the top of an adjustable-height framework. In this position, the motor switch is conveniently located

CLARK Type "PML" LATCH RELAYS

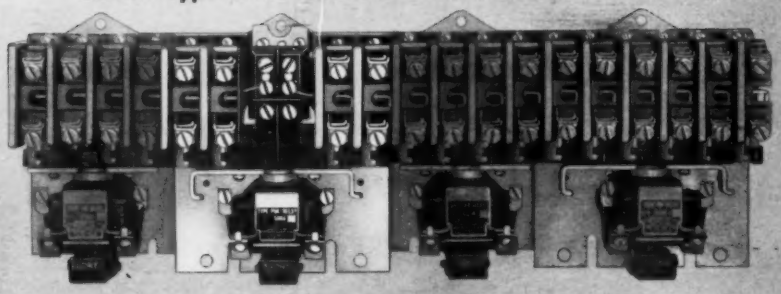
— have all features of CLARK Type "PM" Relays, including SECTIONAL POLE CONSTRUCTION

- **LATCH MECHANISM** replaces 2 poles of Type "PM" relay directly above relay magnet.
- **LATCH ASSEMBLY** easily removed or replaced as a unit by removing wiring and only two screws.
- **LATCH UNIT** has its own magnet—operates independent of relay magnet. No adjustment to get out of order.
- **LATCH COIL** is built for continuous duty—eliminates need for use of relay pole to cut out coil when unit is energized.
- **SPRING-LOADED LATCH** holds contact arm in energized position after relay magnet has been de-energized. Releases only when latch coil is energized.
- **LATCH WEARING SURFACES** are nylon against phenolic—minimizing friction and wear, and assuring longer life.
- **LATCH UNIT** is completely insulated from relay contacts.

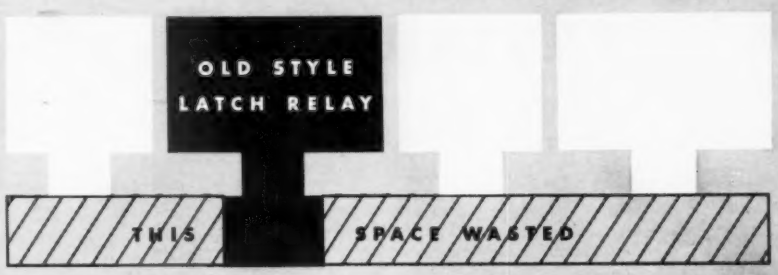


CLARK Type "PML" 4-Pole Latch Relay

CLARK Type "PML" LATCH RELAY



Clark latch relay in row with Clark Type "PM" relays. Note horizontal alignment.



Latching and non-latching relays of conventional design.

NEW!

CLARK Type "PML"

LATCH RELAY

saves panel space by lining up with standard CLARK Type "PM" relays

Clark Type "PML" *mechanically held, latched-in* Relays have the same basic "modular" design as Type "PM", which have set new standards for flexibility of panel arrangement and economy of panel space. Contrasted with other latch relays, where the latch mechanism extends several inches below the magnet assembly, they have the same vertical dimensions as corresponding Type "PM" models—lining up perfectly with them, as shown above. The range of models shown below includes sizes and types to meet every demand for a 10-ampere latch relay.

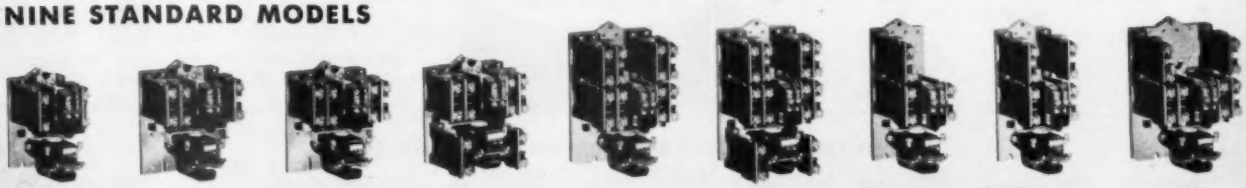
For complete information, write for Bulletin 7305-PML

The **CLARK CONTROLLER** *Company*

Everything Under Control 1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

NINE STANDARD MODELS



2 POLE | 3 POLE | 4 POLE | 6 POLE | 8 POLE | 10 POLE | ALTERNATE 3 POLE | ALTERNATE 4 POLE | ALTERNATE 6 POLE

YOU CAN **bet your life**
ON A **super safe**

IDEAL

VOLTAGE TESTER

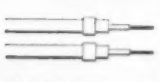


with Famous IDEAL DOUBLE PROTECTION

. . . a solenoid, calibrated indicator and a neon test lamp, each independent of the other—no chance of failure to detect voltage!

TESTS 100 TO 550 VOLTS AC—110 TO 600 VOLTS DC

HAS ALL THESE FEATURES, TOO!



Molded Prod Handles—"no slip" safety rings. 30" neoprene leads



Handier . . . Center mount for prod makes testing easier



Prod Storage . . . completely shields sharp tips



Coil layer-wound . . . on rugged nylon spool for long, safe life.



Coil secured... at both ends—Coil leads isolated, preventing shorts



Plastic name plate . . . bonded to double-strength seamless plastic case—no surface metal

IDEAL'S Super Safe Voltage Tester was especially designed to answer the needs of electricians, maintenance men and contractors. Tells at a glance whether line is "hot"... AC or DC . . . and the nominal line voltage. The solenoid indicator is on an easy-to-read calibrated scale that is color coded to correspond with fuse label colors. A trial will convince you that the Super Safe Voltage Tester is the most convenient, safest and easiest to use tester on today's market.

SEE YOUR IDEAL DISTRIBUTOR, OR MAIL COUPON
In Canada: Irving Smith, Ltd., Montreal

IDEAL INDUSTRIES, Inc.
1041-C Park Ave., Sycamore, Ill.

Please send me full catalog information on the IDEAL Super Safe Voltage Tester.

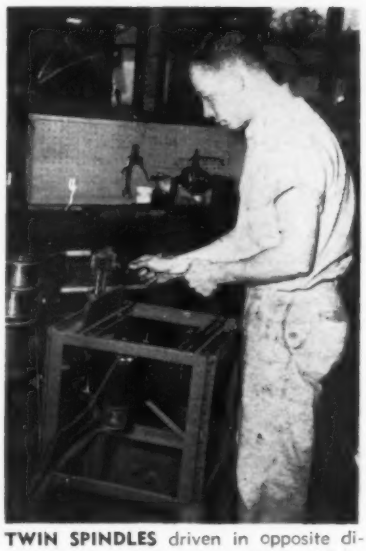
Name_____

Company_____

Address_____

City_____ Zone____ State_____

IDEAL



TWIN SPINDLES driven in opposite directions by a vertically-mounted ¼-hp motor speed the chore of stripping insulation from leads in this modern shop. Reverse direction is obtained by twisting one of the drive belts into a figure-8 before placing it around corresponding spindle sheave.

at the top of the motor, while the motor shaft protrudes sufficiently below the base board to permit free passage of the belts.

With spindles moving at high speed in reverse directions, insulation is quickly brushed from vire ends, leaving leads clean and bright. The rig was made in the Electric Motor Service Shop, Kennett Square, Pa.



WELDING TORCH and gas cylinder are carried about the Industrial Electric Company shop in York, Pa., by means of simple holding rig constructed of strap iron and small-diameter pipe sections. Horizontal holding rig can be loosened and quickly retightened with aid of thumb screws when new cylinder is inserted. The arrangement increases the portability of the tool and facilitates manipulation during use.

. . . Your best motor investment is Century



Nation-wide service . . . another plus-value

Fast service, precise application engineering! You and your customers have to be sure of getting them, whenever and wherever they're needed. Century has them mapped out, right where they'll do the most good.

A nation-wide network of sales offices, distributors, stock points, service stations. Locations strategically pegged to your requirements . . . as are Century motor representatives in almost every foreign country.

Put this plus-value together with Century's acceptance through performance, and Century's complete line of motors, 1/20 to 400 HP. More reasons why your best motor investment is Century. Call your local Century man or Authorized Century Distributor now.

Century MOTORS

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri • Offices and Stock Points in Principal Cities



IF IT CARRIES CURRENT, KW CARRIES IT!

MOORESVILLE, IND.

KW SE-U SAVES ON SERVICE

The new home shown at the right was wired recently as a model unit to test the economy of adequate wiring with modern KW *Aluminum* wire and cable. Here's the result:

100 ampere service on KW Aluminum costs less than 65 ampere service on copper.

With loads steadily building up, the trend is toward larger sizes. At the same time, *savings with aluminum become even more important.*

Typical example: the cost of #3 copper conductor is *89%* higher than #2 aluminum conductor! (Both sizes meet National Electrical Code requirements for 100 ampere service.)

SE-U Economical In Special Applications

As demonstrated in the Mooresville home, savings with aluminum SE-U do not end at the switch box. For hook-up of built-in range, hot water heater and dryer, KW Aluminum SE-U unquestionably provides savings over copper non-metallic sheathed cable, as well as greater safety through higher quality product.

In short, KW Aluminum SE-U will save you money and help you improve service all the way from the pole to the appliance!

For immediate service, or for further information and samples, call the Kaiser Aluminum sales office or the KW distributor listed in your telephone directory.

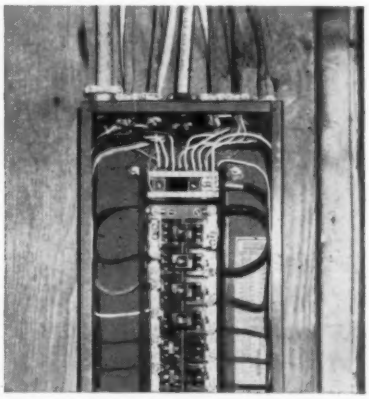
Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Bldg., Oakland 12, California; *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois.



KW Aluminum SE-U may be brought directly to water heaters in homes or commercial buildings.



Range hook-up in Mooresville model home shows how KW SE-U may be used "as is." Elimination of conduit increases savings.



Main switch panel shows variety of KW Aluminum wiring applications. They are as easy to work with as copper.

CONTRACTOR SHOWS HOW ENTRANCE, APPLIANCE HOOK-UPS



KAISER ALUMINUM

LIVE BETTER ELECTRICALLY

IF IT CARRIES CURRENT, K/W CARRIES IT!

See "MAVERICK" • Sunday Evenings, ABC-TV Network • Consult Your Local TV Listing



ALLIS-CHALMERS
individually enclosed LOW VOLTAGE BREAKERS

If you're setting the trip device or making inspection...



Get a long look in a short time

simply removing deep front cover



The deep cover is the *not-so-deep* secret of safe, easy adjustment and inspection of Allis-Chalmers individually enclosed low voltage breakers. The entire breaker can be inspected without removing it from its position.

For the complete story on why Allis-Chalmers breakers are easy to use, as well as easy to install and maintain, call a local Allis-Chalmers distributor or office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5564

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NEW PRODUCTS
CATALOGS, BULLETINS
ADVERTISEMENTS

USE THESE CARDS

- **PRODUCT NEWS, PRODUCT BRIEFS:**

  Use first line of boxes. Insert item numbers of products on which more information is desired.

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  Use second line of boxes. Insert item numbers of literature desired.

- **ADVERTISEMENTS:**

  Use third line of boxes. Insert page numbers of advertisements on which additional information is desired. Where more than one advertisement appears on the page, include the manufacturer's initials.

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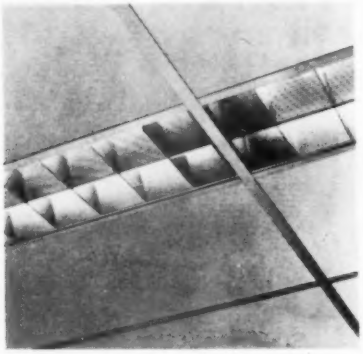
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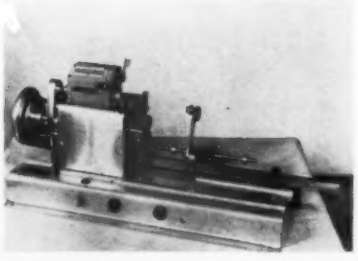
Product News



Troffer-Ventilator (1)

A new recessed troffer strip with air diffusion, called "Paraflo", can be readily installed in any hung ceiling. Air diffusion takes place along the center parabolic louver which is perforated. Divergence of the air stream through the V of the parabolic louver improves the distribution of conditioned air and reduces smudging of ceiling surfaces. Units can deliver up to 150 cfm at normal temperature differentials. The total free area of perforations provides low pressure drop and a correspondingly low noise level. Air handling components may be quickly installed or interchanged. A new type volume control valve is readily accessible for adjustment without removing the louver assembly.

Day-Brite Lighting Inc., 16 N. 9th St., St. Louis, Mo.



Bobbin Winders (2)

Two new bobbin winders have rugged head design. Advantages of the new AB winder comes from its ability to wind multiple bobbins of unusual length or diameter. Feeds wire as small as 0.002 in. and as great as 0.05 in. A high speed, lever-reset counter is used. Direction of traverse (normally automatic) can be changed at any time. Pilot lights indicate direction of feed. Control knob used to position the guides and disengage the feed. Separate switch permits stopping the motor without affecting the reversing circuit. Model ABS is a short version of the AB design. Heavier versions of these machines will feed wire as heavy as No. 0 or No. 8-No. 12 in multiple.

Coil Winding Equipment Co., Oyster Bay, N. Y.



Dust-tight Fixture (3)

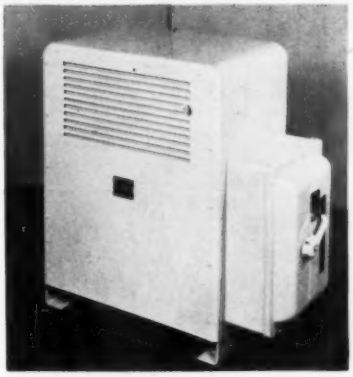
New prismatic lighting unit No. 02450 for Class II, groups E, F, and G and class III locations. Glass member is supported by stainless steel bails and cam latches. All metal parts corrosion resistant including stainless steel cam pins. Designed for 200-watt lamps, unit provides 52% output in the 0°-60° zone and 86% overall. Cast aluminum fitter tapped for ¾ in. Has wide application in chemical, petroleum, textile, woodworking, and similar industries. Approved by UL.

Holophane Company, Inc., 342 Madison Ave., New York 17, N. Y.

Battery Charger (4)

A new charger with a hermetically sealed silicon rectifier has no aging characteristics, thereby eliminating the need for aging taps. The unit, used for charging 12-volt industrial batteries, can be mounted on top of a 6-cell battery, or on the wall. It operates from a 15-amp, 60 cycle single phase, 115-volt ac line, and plugs into a standard receptacle. Available in two models of 450- and 660-amp hours with an automatic timer that cuts off after 16 hours of operation.

C & D Batteries Inc., Washington and Cherry Sts., Conshohocken, Pa.



Transformer-Breaker (5)

This compact unit features a dry-type distribution transformer and a circuit breaker as one piece of equipment. The breaker is mounted on the side of the transformer enclosure and is connected to the high-voltage side of the transformer. Load and feed connections, plus connections between breaker and transformer are compactly arranged with good accessibility. Available in sizes up to 300 kva.

Westinghouse Electric Corp., Box 2278, Pittsburgh, Pa.



Shatter-Resistant Fixture (6)

A new outdoor fixture designed to reduce vandalistic breakage is now available in plexiglass and aluminum. Incandescent, fluorescent, and mercury vapor lamps can be used with the unit. Neoprene gaskets keep out dust and rain. The unit, light in weight, can be installed by one man in post (Lumi-Post) and pendant (Lumi-Pend) locations.

Silvray Lighting, Inc., 100 W. Main St., Bound Brook, N. J.

COMPLETELY

NEW DESIGN

midwest

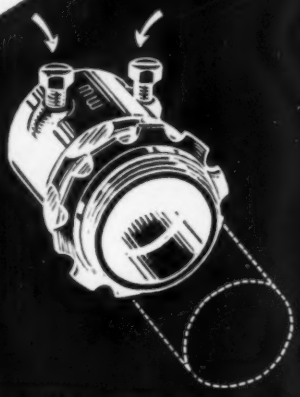
CONCRETE TIGHT

CONNECTORS and COUPLINGS

FOR THINWALL CONDUIT

SET SCREW TYPE

Patent Pending





EMT sizes 1¼", 1½" & 2"

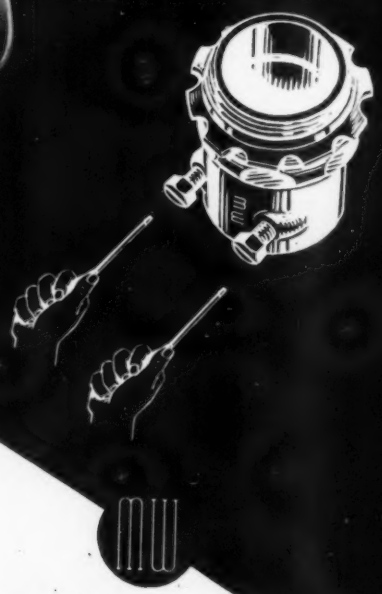
- Staked set screws
- Large (¼-20) set screws
- Hex head for easier tightening
- Deep slotted head for better screwdriver purchase
- Threaded hub 22% longer to accommodate insulating bushing
- Heavy gauge seamless steel body.

"SIDE-BY-SIDE" set screws provide contact points on two different center lines of the conduit—

- assures that *both* set screws hold positively
- no conduit distortion
- completely eliminates obstruction in raceway

- **Tangentical locking . . .**
- Set screws provide wedging action against conduit
- Threads score conduit for positive tightening
- Maximum width between set screws for tool clearance





Here is another Midwest development in providing quality fittings. "Quality" is just a condensed way of saying: "Getting the total job done . . . right . . . with the most inexpensive combination of material and man-hours". Engineering and producing quality fittings to meet the highest standards of electrical wiring requirements, is our objective at Midwest.

Midwest Electric Mfg. Company

MANUFACTURERS OF ELECTRICAL WIRING PRODUCTS

1639 W. WALNUT STREET

Chicago 12, Illinois



Transformer Tap Changer (7)

The new tap changer is moulded in one piece of high thermal stability phenolic. Contact is made through a bridging roller which is under tension. The roller is grooved to increase contact surface for low resistance and cool operation. Operation is through a screw-on cap which reverses into a knob. Knob can not be removed, after operation, if switch is not in a proper contact position. The new changer retains the many advantages of its predecessor, among these are elimination of need of entering the tank, and easy recognition of the tap position.

R T & E Corp., Waukesha, Wis.



Power Fastening Tool (8)

Increased safety from the danger of over-driven fasteners is an important feature of the new "Flite-Chek" powder-actuated fastening tool. Control of the fastener is accomplished by a new assembly of tapered interceptor jaws which prevents the passage of an overpowered fastener or one that encounters soft or thin spots in the work surface. The fastener is stopped before it leaves the tool. When the fastener is stopped in this manner, the operator simply pulls the tool off the work and is ready for another fastening. The new tool also features speedier setting of fasteners (150 per hour), reduction of surface spall, and versatility in confined areas. Increased application is expected in areas where restrictions have previously limited its use.

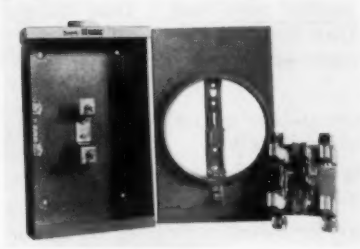
Ramset Fastening System, Olin Mathieson Chemical Corp, Cleveland, Ohio.



Cable Trailer (9)

The new "Reel-Safe" trailer conversion kit can handle cable reels up to 90 in. in diameter, and weighing up to 5 tons. The kit, adaptable to any PWD, PCP, W-PCP, or similar trailer, features two-minute loading or unloading by two men. A truck's winch pulls the reel bar with reel up an inclined track to a point where a locking bar secures it for traveling. The kit makes modernization of old trailers practical.

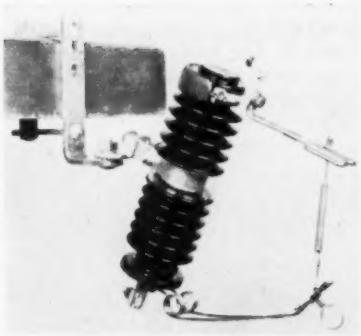
Tele-E-Lect Products, Inc., 10,000 Minnetonka Blvd., Minneapolis 26, Minn.



Meter Pan By-Pass (10)

Meter changing without service interruptions is a feature of a new manual by-pass meter trough. By-pass can not be closed until meter seal is broken and ring removed. No special tools required; meterman needs only screwdriver to engage by-pass. New cover and interior interchangeable with existing boxes. Unit is available in a variety of socket meter troughs.

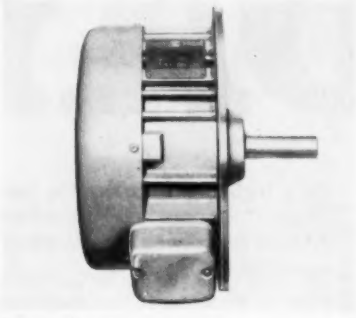
Murray Manufacturing Corp., 1250 Atlantic Ave., Brooklyn 16, N. Y.



Flip-Oven HV Current (11)

Flip-open cutouts have been completely redesigned to make them stronger and more durable. Metallic parts are now made of bronze instead of steel for better resistance to corrosion, and they are clamped instead of cemented to the porcelain insulator. Eye-bolt connectors are tin-plated to accommodate either aluminum or copper conductors ranging in size from No. 8 solid to No. 2 stranded. Available in 7.8 and 15 kv ratings for individual crossarm mounting and 7.8 kv rating for unit combination or bushing mounted.

General Electric Co., Transformer Div., Schenectady 5, N. Y.

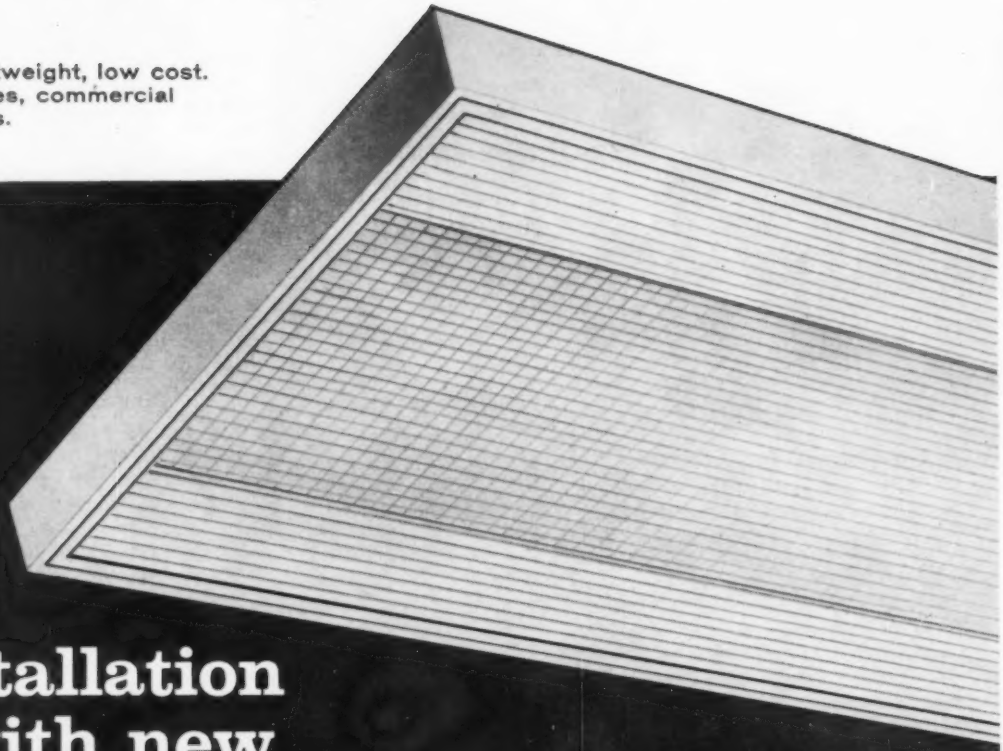


Pancake Motor (12)

New "Pancake" type motor reduces motor length 60% over conventional motors. Available in open drip-proof and enclosed types. Motor is of conventional radial air-gap design; length reduction is achieved through formed end coils and a one piece housing bracket. Rated at from 1 to 15 hp at 1800, 1200 and 900 rpm. Additional features are vertical or horizontal mounting, and factory lubricated bearings. Designed for use on machine tools, roof ventilating fans, and other space-cramped applications. Bulletins No. 2100 and No. 2150.

The Louis Allis Co., 427 East Stewart St., Milwaukee 1, Wis.

CLEARTEX®... lightweight, low cost. Best choice for offices, commercial buildings and schools.



cut installation costs with new...

DAYLUME®

In a lighting fixture, it's the installed cost that counts! So consider what these Day-Brite DAYLUME features mean to you in time—and money—saved on the job:

Can be wired through sides, centers or ends to permit side-by-side, end-to-end or end-to-side installation.

Recessed back plate design assures snug alignment with ceiling.

Mounting straps with wing-nuts are furnished with all units.

Enclosures have *separable* hinges . . . hinge from either side.

Like *all* Day-Brite fixtures, DAYLUME units are shipped assembled, ready to install.

Equipped with separately fused CBM ballasts for added safety in event of ballast failure.

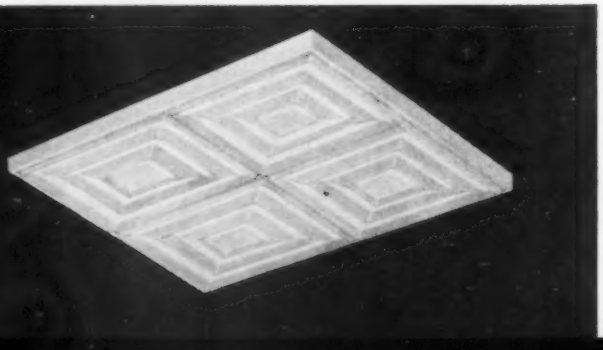
Just 3¼ inches *thin!* Recessed appearance with surface-mounted flexibility. Placement is not restricted by structural and mechanical components.

Six sizes. Widest variety of enclosures. Match Day-Brite recessed fixtures.

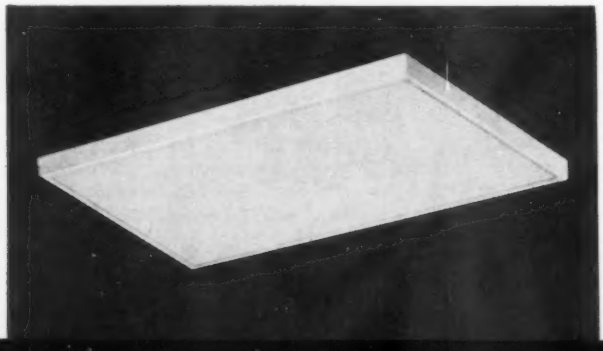
Glass enclosures are cushioned with vinyl gaskets to reduce breakage.

Plastic panels are completely framed. Frames have inner flanges for greater strength.

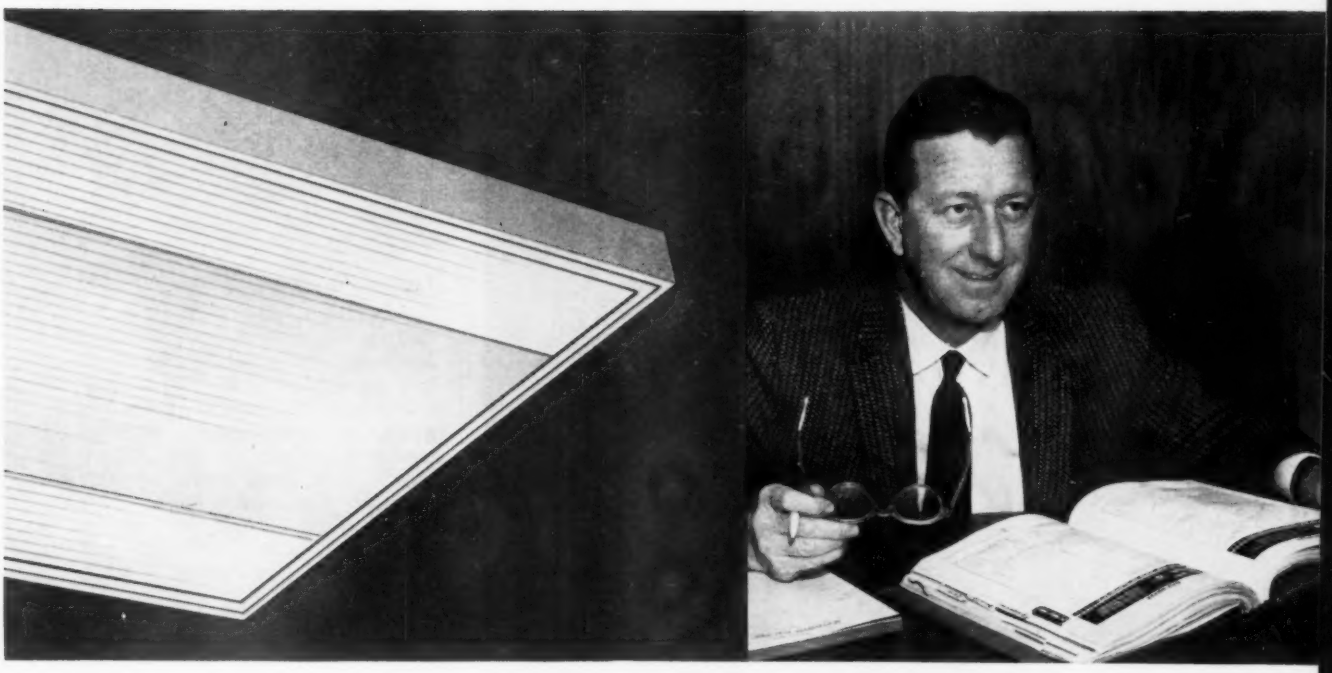
DAYTEX—clean, concentric square design adds pleasing accent to ceilings of stores, banks and auditoriums.



PATTERN 70® glass lens panel by Corning—high lighting efficiency for schools, private and general offices.



DAY-BRITE... the Contractor's Choice



surface lighting elements by

DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

"Compared against the field, Day-Brite offers extreme labor savings"

... says JACK H. DISHER,
Southern Electric Co.,
Charleston, South Carolina

"When Day-Brite supplies the fixtures, all parts and components are there when you need them.

"What's more—they *fit*. They're sturdily built and engineered with installation problems in mind.

"When you line up Day-Brite fixtures, they *stay* lined up.

"We can afford to pay more for Day-Brite fixtures and give our customers the advantages of Day-Brite quality. It's easy to make up the small price differance on labor savings."

For free illustrated booklet on DAYLUME, call your Day-Brite representative listed in the Yellow Pages... or mail coupon.

Day-Brite Lighting, Inc., 6248 N. Broadway, St. Louis 15, Mo. • Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

Z-89

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Certified Lighting for a Better America

DAY-BRITE LIGHTING, INC.
6248 N. Broadway
St. Louis 15, Missouri

Please send _____ copies of Day-Brite's new illustrated booklet on DAYLUME surface lighting elements.

Name _____

Company _____

Address _____

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WIN THIS VOLKSWAGEN SERVICE TRUCK!

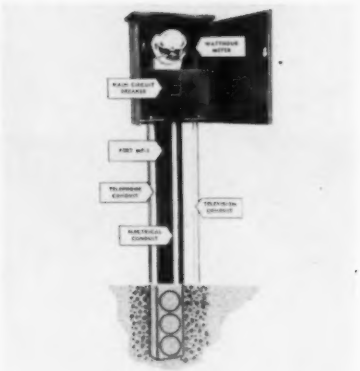
Remcon Contest for Electricians!

25 miles to the gallon. Thousands of dollars worth of the world's most modern motor-vehicle engineering. And it's *free* to the man who submits the most imaginative and practical use of REMCON on an actual installation.

Just pick up your Entry Envelope (with entry blank, full information and helpful suggestions) at your REMCON distributor – or write REMCON Division, Pyramid Instrument Corporation, Lynbrook, N. Y.

REMCON

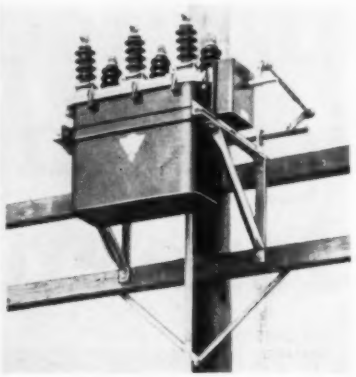
REMOTE CONTROL SWITCHING DEVICES



Trailer Park Meter Cabinets (13)

Supplying all electrical needs, including telephone and TV leads, in one compact unit is the feature of this new line of trailer park electrical distribution units. Pre-wired units, in ten models, includes weatherproof cabinets with hinged door, meter pan, main breaker, mounting post, and connectors for trailer leads. Single and double service, 120/240, 120/208, and 120-volt only, single phase, 30 to 50 amp. Bulletin No. 18 available.

Myers Electrical Products, Inc., 3019 S. Vail Ave., Los Angeles 22, Calif.

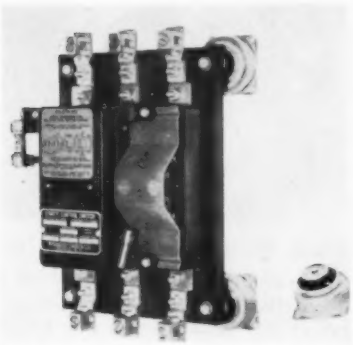


Oil Switches (14)

New oil switches designed to operate at low power factors augment the line of 3-phase, outdoor, type V switches. Rated at 15 kv, 400-amp and 110 kv BIL, the new switches offer sectionalizing and load-break applications on highly inductive loads. With phase-to-phase ratings of 14.4 kv, model VLH is hook-stick operated, VLR is motor operated, and VLM is manual-remote handle operated. Will interrupt 400 amps of lagging current at power factors of 10 to 100%. Momentary latching ratings are 20,000 amps asymmetrical, and the 4-second rating is 6,000 amps symmetrical. Accesso-

ries include pole and substation mounting assemblies, heater elements, low-voltage signal arresters, and auxiliary switches.

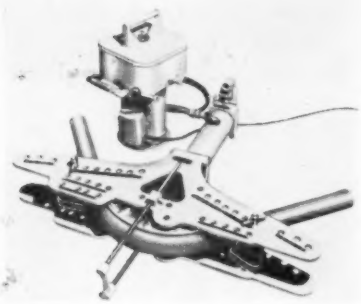
Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.



Vibration Mounts (15)

Vibration and soundproof enclosures are new additions to the "ASCO" line. Designed for use where quiet operation is essential. Operation of normally installed remote controlled switches was audible at 250 ft; with vibration mounts used, the noise was not objectionable at 35 ft; when the switch was placed on vibration mounts and installed in a sound-proof enclosure, noise was faintly audible at 3 ft. Bulletin No. 627 is available.

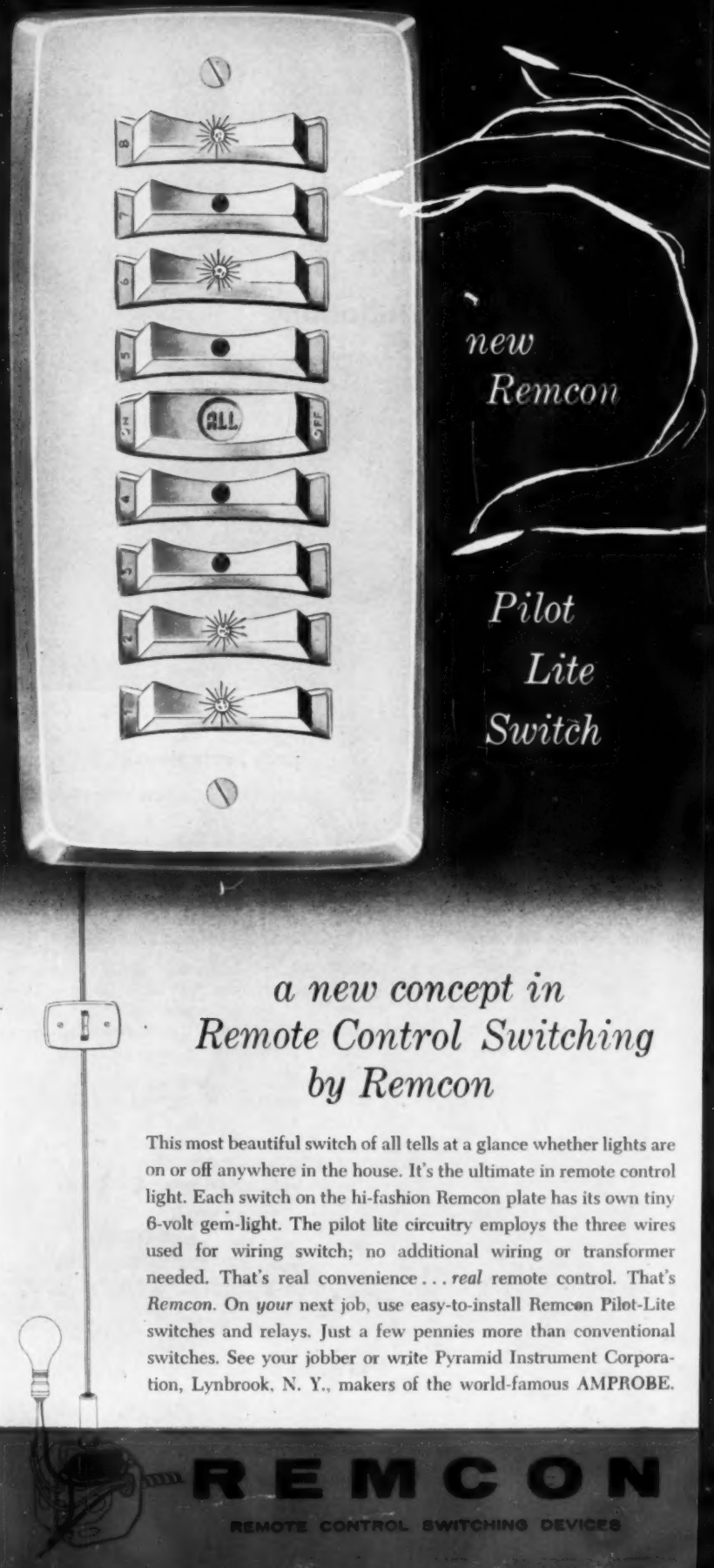
Automatic Switch Co., Florham Park. N. J.



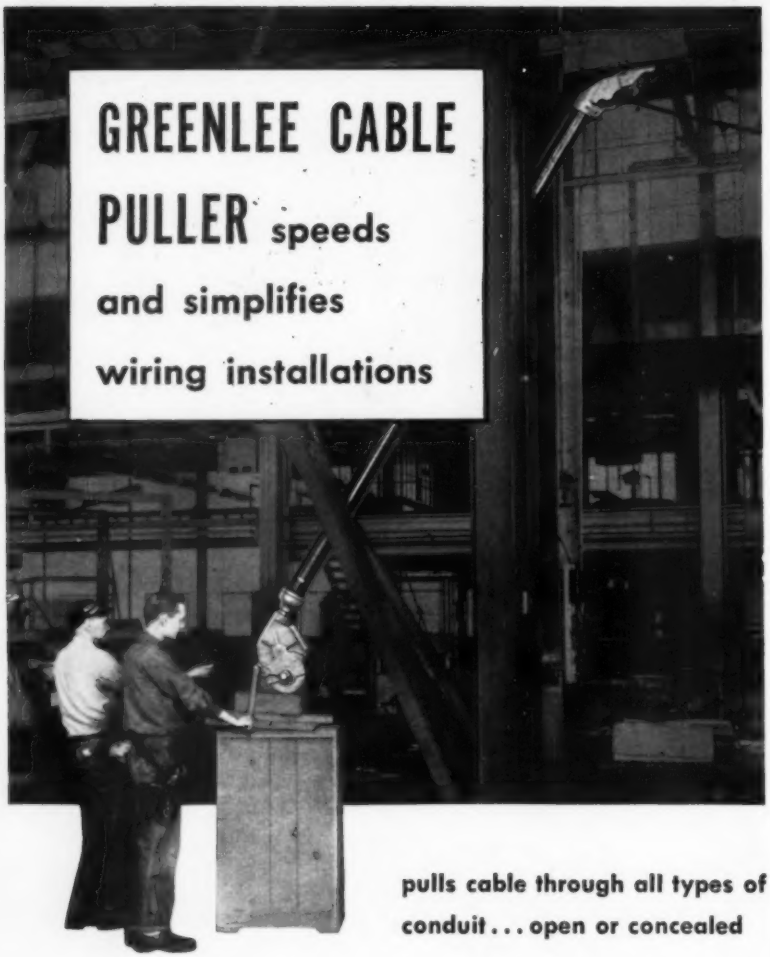
Hydraulic Motor Pump (16)

A new light weight pump develops 10,000 psi and delivers 80 cubic in. of oil per min. It is driven by a ½ hp, 1750 rpm motor, 110/220 volts and weighs 65 lbs. Designed for use with pipe benders, knock-out punches, and pipe pushers, the unit is also useful for pulling gears, bushings, bearings, and other shop uses as a replacement for mechanical power.

Tal Bending Equipment, Inc., Milwaukee 2, Wis.



GREENLEE CABLE PULLER speeds and simplifies wiring installations



pulls cable through all types of conduit . . . open or concealed

Here's an on-the-job view of a standard GREENLEE Cable Puller with a flexible elbow attachment making simple work of what could have been a mighty tough job.

In about five minutes, three 1,000,000-circular-mil cables were pulled through an 80-foot length of 4-inch conduit which is some 18 feet above the floor level. Setup time included, the entire job took approximately an hour and was handled simply, easily.

Whether you have high overhead jobs like this calling for the use of the attachment, or more routine work, you'll find the GREENLEE Cable Puller a big timesaver that helps get the job done faster, at lower cost. With it you *pull in line with the conduit.* When used without attachments for concealed conduit work, it clamps directly on the conduit. You get a fast, easy pull without straining conduit hangers and eliminate heavy, cumbersome equipment. Use it for open or concealed conduit . . . high up, in close quarters, or out in the open.

It's a powerful puller . . . exerts a maximum pull of 7,500 pounds and has two speeds: one for fast work, the second for a steadier, heavier pull.

Portable, easy to carry, set up and operate. Write today for complete reference folder on this and other GREENLEE timesaving tools for electricians. Greenlee Tool Co., 1743 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE

OTHER GREENLEE TIMESAVING TOOLS FOR ELECTRICAL WORK

Hydraulic Conduit Benders • Tubing Benders • Auger Bits and Drills • Knockout Punches • And many more



Drum Hoist (17)

A new drum and container hoist called "Grizzly Roto-Tilt" eases the job of lifting and emptying heavy drums, barrels, containers, and boxes. After the rig is securely fastened to the container and the load lifted through the hoisting clevis, the load can then be tilted to any angle by unlocking a trolley to which the hoisting clevis is fastened and moving it along a curved track. Unit can be used with fork trucks, chain falls, cranes, and hoists; it is useful on construction jobs, in warehouses, and on loading platforms. Capacity 1000 lbs. Special fittings available.

Pucel Enterprises, Inc., 3746 Kelley Ave., Cleveland 14, Ohio.

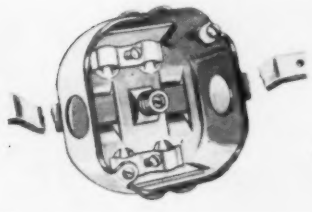


Outdoor Fluorescent (18)

Circular fluorescent lamps are used in a new outdoor fixture called "Circa-Lite". Up to eight "module" units may be plugged in, one upon the other, to produce a light output of 2500, to 20,000 lumens. Unit is topped with a shallow-dished 36-in. reflector. All aluminum construction, in heights to 20 ft, allows for

easy maintenance. A choice of three pole bases is offered, one of which is hinged for maintenance at ground level.

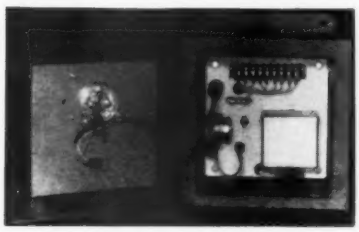
The Kenworth Co., Winsted 1, Minn.



Ceiling Bar Box (19)

A redesigned ceiling bar box for BX and Romex cable allows more fixture weight to be supported by the box, rather than by the stud alone. The box is fastened directly to the bar and is tightened in place by the stud which can not spin around and loosen. The stud is stronger but more compact, which allows more space for wires.

Arrolet Corp., Montgomery, Pa.



Punch Press Control (20)

A new control for punch presses is sensitive to extra-hard material and to "double-feed" of regular material. When a load upon the motor, for any reason, increases the running current beyond a previously set value, the press clutch is magnetically disengaged, stopping the die movement, thereby protecting the dies and the press itself. Normal running current can be read on an ammeter which has a second adjustable pointer whose position determines the tripping current value. A time delay bypasses the initial surge. Press speeds as high as 450 strokes per min. can be handled by this control. Units are available for 110, 220, and 440 volts with motor current control ranges of 1, 5, 20, and 100 amps. Phase-fault protection is an optional feature. Bulletin AC-5 available.

Tipptronic, Inc., Chagrin Falls, Ohio.



UNDERFLOOR DISTRIBUTION

curves in the right places

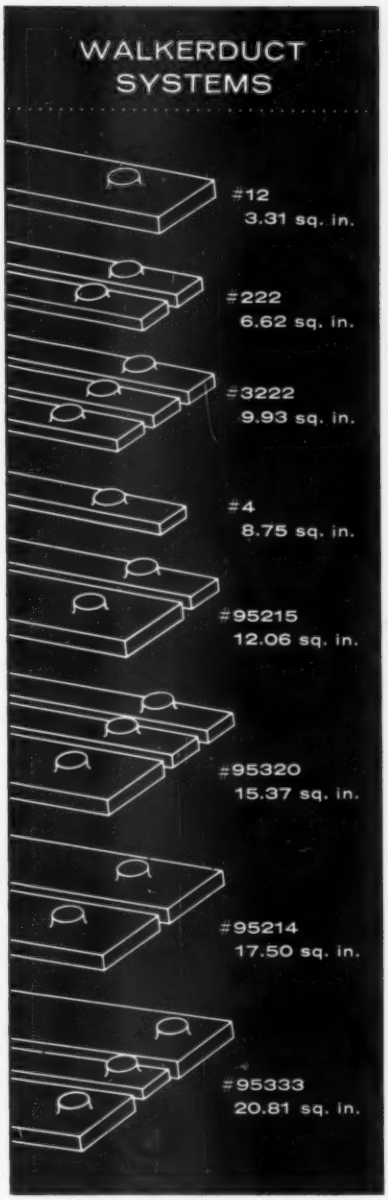


simplify wire-pulling in larger, belled-out WALKERDUCT inserts

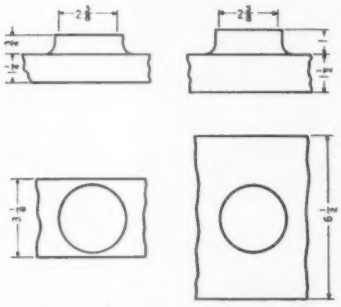
Faster installation is one advantage of these new, larger Walkerduct inserts ... with belled-out bases that enable wire and cable to slide through more speedily. *Greater safety for cable and wire* is another feature, since there's virtually no risk of damaging insulation during installation.

With inside diameter of 2⅜" (compared to former 1.9" I.D.), inserts are generally spaced on 24" centers. Minimum heights: ¾" on No. 2 duct, 1" on No. 31400 duct. Greater heights available as specified. Open end of each insert is sealed with a removable steel cap, recessed to receive concrete. Want further information on Walkerduct Systems and component parts? Write for Catalog 354 I. Walker Brothers, Conshohocken, Pa.

WALKER
OF CONSHOHOCKEN

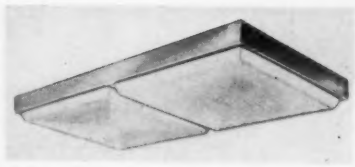


STANDARD AND LARGE CAPACITY WALKERDUCT



CAT. NO. 2 DUCT

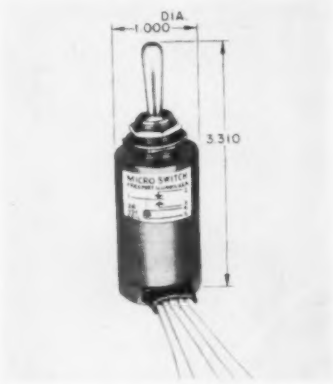
CAT. NO. 31400 DUCT



Fluorescent Fixture (19)

A new "Spacelighter" fixture features open top construction for use in direct-indirect suspension. The unit consists of a rigid frame forming the periphery of the fixture. A vinyl type diffuser rests on a flange around the bottom of the fixture with ballasts in the side channels. 3 in. deep, the unit is very light in weight. Finish is baked enamel on phosphatized steel.

Leadlight Fixture Co., 800 100th Ave., Oakland 3, Calif.



Toggle Switch with Relay (20)

A new momentary-contact toggle switch No. 5ETI-6 has a built-in holding coil. The unit is slightly over 3 in. long and 1 in. in diameter. The solenoid, when energized, holds the switch in its manually operated position until de-energized; the holding action can be manually overridden. The switches are rated at 4 amps, 28 volts dc resistive load. The switch and solenoid are sealed with an inert gas to improve constant operating characteristics in various atmospheric conditions. The switch may be wired NO, NC, and SPDT.

Micro Switch, Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.

Vibration-proof Lamp (21)

Improved design of the elements suporting the filament of this new lamp increases its ability to absorb vibration and shock. Hard glass envelope also makes it weatherproof. Heavy lead-in wires are connected and reinforced near the filament by a glass bridge; supports for the filament are attached to this bridge. This provides a compact unit structure which reduces lead-in wire whip-around, and, filament twisting and stretching. Bulletin No. 27 available on request.

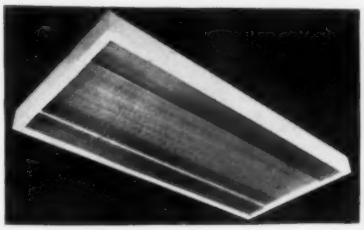
Radiant Lamp Corp., 300 Jelliff Ave., Newark 8, N. J.



Mounting Bracket (22)

A new dual-mounting bracket for banking transformers, to EEI-NEMA standards. Keyhole slots simplify mounting of transformers and bracket simultaneously on prepositioned bolts. Hot-dip galvanized, all-welded construction.

Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.



Thin Fluorescent (23)

New line of fluorescent fixtures called "Daylume" gives recessed appearance although surface mounted. Available with glass or plastic panels which can be hinged from either side for easy maintenance. Provided with separately fused C.B.M. ballasts, the unit can be wired through either side or ends. Recessed backplate improves ceiling contact. This 3¼-in. thick fixture can be arranged in tandem, right angle, and side-by-side combinations. Available in six sizes, to take 2- or 4-ft lamps, of 2, 4, 6, or 8 lamps each.

Day-Brite Lighting, Inc., 16 N. 9th St., St. Louis, Mo.

Uptegraff



40% Greater Overload with Silicone Impregnation

Unique Design Features of Major Models



Type H...
3-10 kva

Small, wall-mounted
Silicone impregnated,
Class H insulation
Totally enclosed
(dust-tight)
Accessible clamp-type
terminals

Announces...

SILICONE IMPREGNATION of Class B Dry Type DISTRIBUTION TRANSFORMERS

Anticipating tomorrow's higher performance standards and increased power requirements, Uptegraff is now producing all of its Class B Dry Type Distribution Transformers, 112½ kva and smaller, with Silicone-impregnated windings.

Overload tests—after extensive research in insulating materials—conclusively prove that transformers with Silicone Impregnation withstand up to 40% greater overload than ordinary varnish, and provide superior moisture resistance and freedom from embrittlement and cracking with age. Organic varnish used by most manufacturers for Class B 80°C transformers degenerates with time and has less thermal stability, while the inorganic Silicone type insulation provides much higher temperature-resisting characteristics.

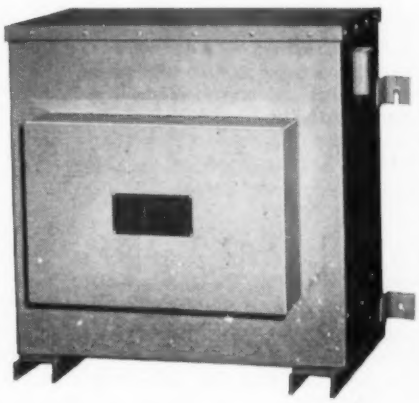
In the comparative test seen on the left, transformers rated for Class B 80°C temperature rise were started with a full rated load. This load was increased by 20% increments and each increment was held until the temperature remained steady. The varnish failed at 210% of rated load while the Silicone-impregnated insulation withstood 300%.

New Bulletin Gives Complete Details...

Bulletin 137 provides additional advanced design features of Uptegraff dry type distribution transformers, 3 kva to 500 kva inclusive, 4800 volts and less. Write for your copy *today*.



R. E. UPTEGRAFF MANUFACTURING COMPANY
SCOTTDALE, PENNSYLVANIA



Type DH & DHT ...15-112½ kva

Junction box for leads and taps
Silicone impregnated, Class H insulation
Totally enclosed (suitable for outdoors)
Flexibility as to mounting
Low sound level



Type DB & DBT ...3-112½ kva

Silicone impregnated, Class B insulation
Ceiling, wall or floor mounting
Metal and porcelain terminal boards
High voltage and low voltage separated on voltages over 600

RIDGID
65R Threaders you've bought would reach 2½ Times Around the Earth!



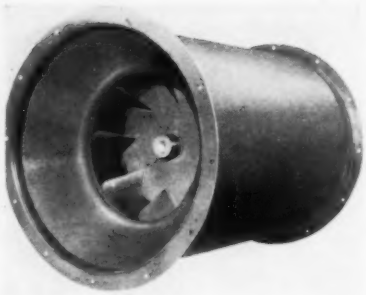
Now this Popular
self-contained 1" to 2"
RIDGID 65R-TC
offers you 3 exclusive advantages



1. Only die stock with True-Centering workholder—no more crooked threads, no time or conduit wasted.
2. Only Jam-Proof die stock—automatic kick-out after standard thread is cut by hand or power.
3. Threads 4 sizes of conduit with 1 set of dies—quick size change.

See 65R-TC before you buy—at your Supply House

The Ridge Tool Company • Elyria, Ohio, U. S. A.



Centrifugal Fan **(24)**

Compactness of tubular fans and efficiency of scroll centrifugals are combined in this new tubular fan. Self-limiting characteristics permit using a motor rated for normal requirements, without danger of overloading. TC fans are offered in 20 sizes from 500 to 100,000 cfm and up to 12-in. static pressure.

Dryer Electric Corp., 164-166 Wallabout St., Brooklyn 6, N. Y.



Floodlight Fittings **(25)**

Fittings for surface-wall and thru-wall mounting of floodlights that do not require the installation of additional splice boxes is one of the features of this new line. One unit is for attaching to an existing outlet box; while the other provides through-wall mounting and full length cover for one or two lampholders. All are precision die cast aluminum, tapped ½ in. to accommodate conduit or lampholder. UL-approved for outdoor use. Bulletin No. 106 is available.

Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J.

Ground Fittings **(26)**

The new "Scru-Tite" line of grounding fittings features interchangeable ground nut, ground hub, and offset hub. The line offers ver-

satility of grounding to the construction and maintenance trades. Available from ½ in. up to and including 6-in. conduit and pipe. Unique serrations on both nut and hub give metal to metal contact and assure more positive grounding. O-ring pre-seated gaskets make water and dust tight seals. Bulletin No. 1057 available.

Myers Electric Products, Inc., 3019 S. Vail Ave., Los Angeles 22, Calif.

Transformers (27)

A new standard line of sealed dry-type transformers featuring aluminum conductors and buswork. Available in ratings of 300 kva and above. Another feature includes a substantial weight reduction. Aluminum also provides greater flexibility of application.

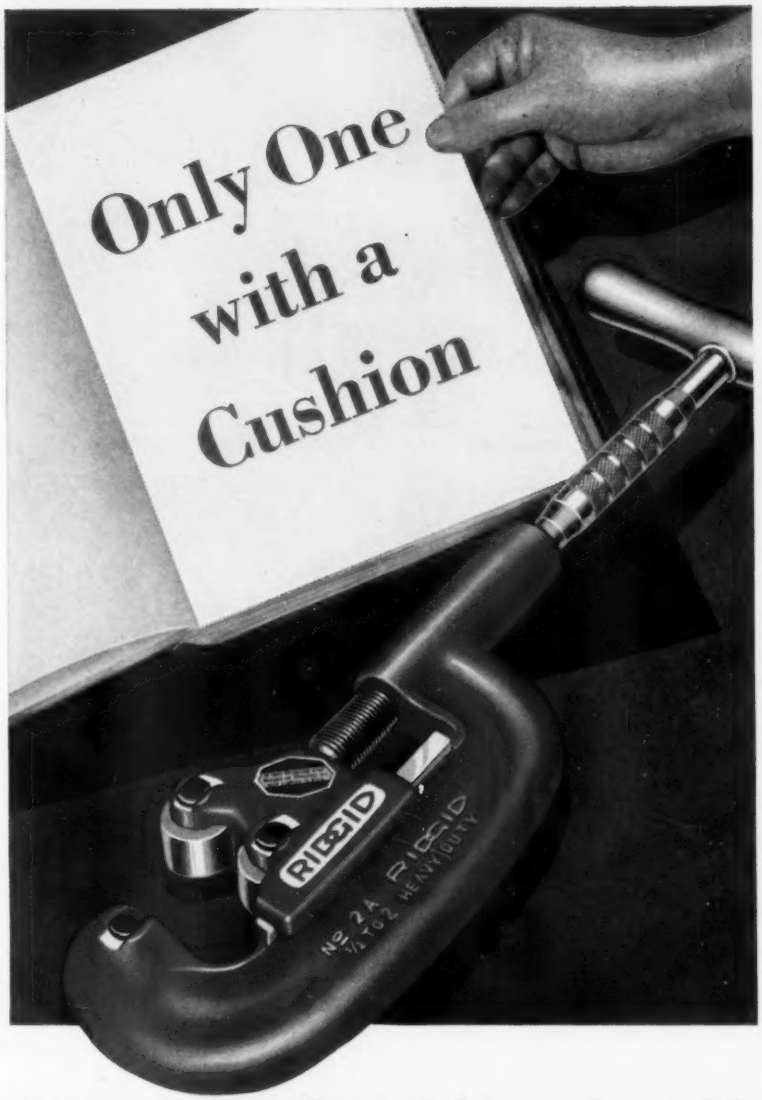
General Electric Co., Medium Transformer Dept., Schenectady 5, N. Y.



Safety Ladder (28)

A new "Hi-Boy" 8 to 12 step all steel ladder is safer and more stable because of a new pyramid design. All models are equipped with handrails and four 4-in. diameter casters for fingertip mobility. Foot operated Ballylocks allow rubber tipped legs to contact floor securely at four points. Units are 30 in. wide at the bottom and 25½ in. at the top. Treads of expanded metal, serrated anti-skid grating, or ribbed rubber are available.

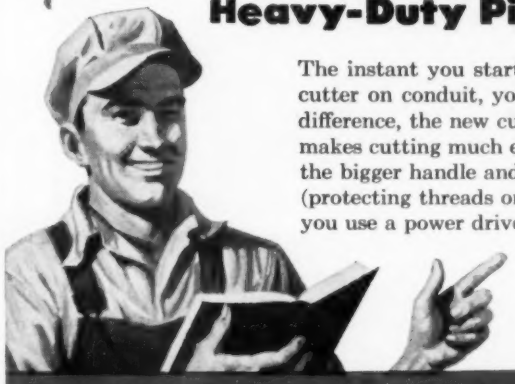
Ballymore Company, West Chester, Pa.



So you get easier quicker action with

New RIDGID

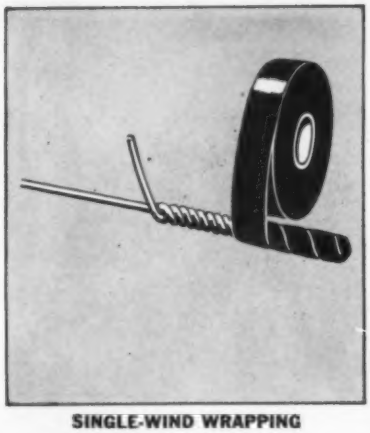
Heavy-Duty Pipe Cutters



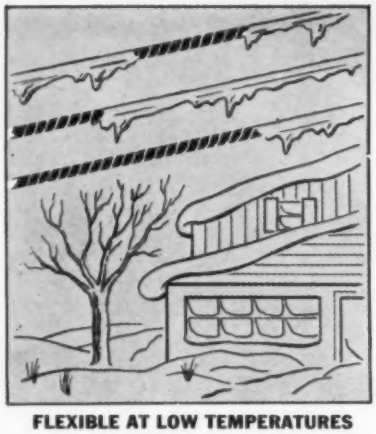
The instant you start feeding in this new cutter on conduit, you feel the remarkable difference, the new cushioning effect that makes cutting much easier and faster. And the bigger handle and extra long shank (protecting threads on screw handle when you use a power drive) helps, too.

Try it, compare it . . . buy it at your Supply House.

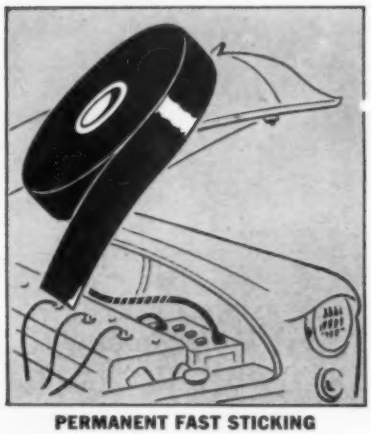
The Ridge Tool Company, Elyria, Ohio, U. S. A.



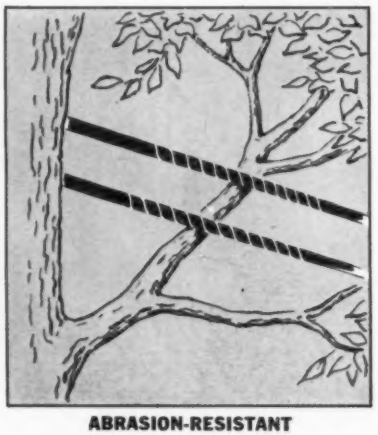
SINGLE-WIND WRAPPING



FLEXIBLE AT LOW TEMPERATURES



PERMANENT FAST STICKING



ABRASION-RESISTANT

OUTSTANDING ONE-WRAP PRIMARY INSULATION

Porter® QUIK-STIK
POLYETHYLENE ELECTRICAL TAPE

- **IDEAL FOR ALL OUTDOOR AND INDOOR, UNDERGROUND OR OVERHEAD WIRING, IN UTILITIES, ELECTRONICS, AIRCRAFT, AUTOMOTIVE, AND GENERAL USE.**
- Permanent strong tack—sticks anywhere!
- Stays flexible from minus 70° F to plus 200° F.
- Dielectric strength tested to 1,000 volts per mil; uniform power factor over wide frequency range.
- Low moisture-permeability, high corona-resistance.
- Resists acids, alkalies, oils, solvents, fungus, bacteria, gases.

GET FULL INFORMATION on new Porter QUIK-STIK polyethylene tape by writing the *Quaker Rubber Division, H. K. Porter Co., Inc.; Philadelphia 24, Pa., or Pittsburg, Calif.*

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION



Reflectors (29)

Two new "Hibay" reflectors for 1000-watt mercury vapor lamps with protective drip shield, No. 643, and without shield, No. 642 have efficient output in the 0° to 45° zone. Thermal updraft through open top keeps reflector clean, and allows cool operation. Drip shield protects reflector and lamp from water without impairing air circulation. Socket assembly can be installed and wired separately from reflector. Suitable for use in hangars, factories, gyms, armories, and machine shops.

Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y.

840 Cycle MG Set (30)

Developed for use with fluorescent lighting systems using high frequency power, the motor-attenuator uses an alternator with three separate single phase outputs, each phase center-tapped 300 volts to ground. Sizes of 7½ to 175 kva available. Driven by standard 220- or 440-volt induction motor. Output 400 and 600 volts at 840, and 1000 cycles.

American Electronics, Inc., 655 W. Washington Blvd., Los Angeles 15, Calif.

Mercury Lamp Transformer (31)

A smaller (25%), and lighter (20%) constant wattage mercury lamp transformer for use with one H-1 400-watt lamp has been announced. Unit is weatherproof-watertight. Current crest factor (peak/rms ratio) is less than 1.7. Open circuit voltage over the entire range is 300 volts minimum. Positive starting down to −30°F. Constant wattage regulation of plus or minus 1% with line voltage swings up to plus or minus 13%.

Sola Electric Co., 4633 W. 16th St.. Chicago 50, Ill.

IT PAYS TO HAVE GOOD CONNECTIONS

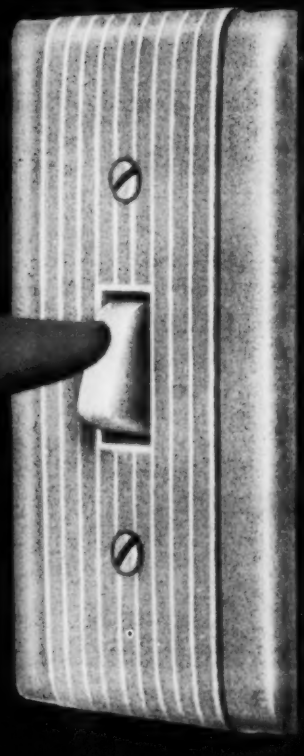
HUBBELL

REG. U.S. PAT. OFF.

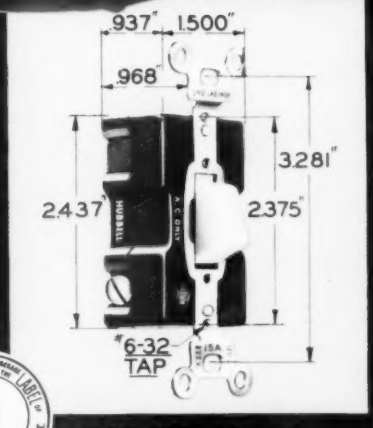
NEW

A.C.

presSwitch



Quality... you can put your finger on



Truly **velvet in performance** . . . "Presswitch", the revolutionary new Hubbell press-type A.C. switch responds to the gentlest press of the finger, touch of the hand or nudge of the elbow. A press, it's on; a press, it's off . . . the smoothest, most convenient and most efficient A.C. switch in Hubbell's famous family of switches.

"Presswitch" is as much at home in a factory as in a living room. Its attractive styling blends with any interior, and its rugged, precision-molded construction represents a new standard of durability and dependable operation. "Presswitch" is a complete new switch line; single pole, double pole, three-way and four-way, now available at your nearest Hubbell distributor.

More on the other side of the page

UL — THE CONTENTS OF THIS PACKAGE BEAR THE LABEL OF Underwriters' Laboratories, Inc.

CAT. NO. 1251-I
15 amps., 120-277 volts
Single Pole A.C. "Presswitch"
with thru-connection
and ivorine nylon button.

HARVEY HUBBELL, INC.

HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE OFFICE AND WAREHOUSE LOCATIONS

Bridgeport 2, Connecticut
State and Bostwick Streets

Chicago 7, Illinois
37 South Sangamon Street

Los Angeles 12, California
103 North Santa Fe Avenue

San Francisco, California
1675 Hudson Avenue

Dallas 7, Texas
1111 Dragon Street

IN CANADA:

Scarborough, Ontario
1160 Birchmount Road



presSwitch

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

a new ARCHITECTURAL CONCEPT in Switch Design and Convenience

Perfect for all general A.C. applications, particularly the control of large fluorescent lighting installations.

Cat. No. 1251
15 amps., 120-277 volts. A.C. "Presswitch" (brown nylon button) showing thru-connection (see below at right)


HOMES


OFFICES


INSTITUTIONS


FACTORIES


RECEPTION ROOMS

Fits standard wall boxes and accommodates standard wall plates. No special wiring required.

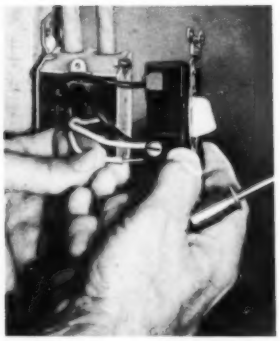
MODERN DESIGN FEATURES

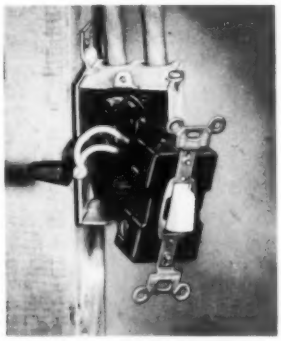
1. Listed by Underwriters' Laboratories.
2. Press action for smoother, easier operation. Nylon button.
3. Functional design blends with conventional and modern interiors.
4. Rugged inner construction provides quiet, effortless performance.
5. Operates in any position.
6. No special wiring required.

SAFE–SECURE

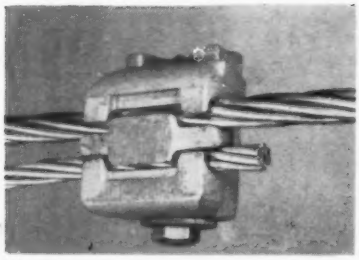
THRU-CONNECTION

SIMPLIFIES WIRING


Wires, normally spliced, are securely joined by inserting them straight in under the terminal screw. Terminals accept two conductors (wire sizes from #14 to #10).


Eliminates this extra splice. Thru-connection speeds and simplifies wiring by eliminating the usual wire splice in most switch installations.

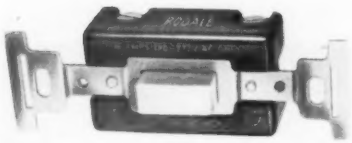
HARVEY HUBBELL, INC.
Bridgeport 2, Connecticut



Cable Connector (32)

Fast installation, high conductivity, and greater durability are features of these new DGA connectors. A center cover-all spacer of soft pure aluminum is supplied with the four larger sizes. Spacer is extended and can easily be picked up for tap insertion. Connector is chemically cleaned and pre-inhibited to reduce contact resistance and protect from corrosion without greasiness or tackiness. New DGD bolted deadend clamp is designed for light-duty pole and house drops. A wave seat in the clamp body affords greater holding power.

Anderson Electric Corp., P. O. Box 2151, Birmingham 1, Ala.



Touch Switch (33)

A new model B "Touchette" push-button type wall switch is rated at 15 amps, 120/277 volts, and withstands motor loads of 80% of rated capacity. 1-in. deep, the unit mounts in a standard outlet box with increased wiring room.

Rodale Manufacturing Co., Inc., 6th & Minor Sts., Emmaus, Pa.

Baseboard Heaters (34)

The new "Dual-Fin" baseboard heater can be installed either side up, without disassembling. Aluminized steel heater elements and Galvaneal steel baffles are used. Baffle arrangement maintains coolness in top and back of heater. Available with wall mounted or built-in thermostat. Rated at 750, 1500 and 2000 watts. Units are 2⅞ in. deep, 6½ in. high, and 36, 72, and 96 in. long. Finished with tan primer.

Electrovector, Inc., 475 Flushing Ave., Brooklyn 5, N. Y.

TOGGLE BOLTS



TWO-WING SPRING TYPE

FINE QUALITY and SKILLFUL WORKMANSHIP are the distinguishing features of Arro Toggle Bolts.

This well made toggle bolt makes fastening to tile, plaster, wall board, or any type of hollow construction, quick and sure. Its lively spring, when released, spreads the steel wings into open position—tightening develops maximum holding power.

Used extensively by electricians, plumbers, decorators, maintenance men, sign men and many other tradesmen.

SCREW HEAD STYLES

TUMBLEHEAD GRAVITY TYPE

Falls into open position to fasten work securely against hollow walls.

RIVETED HEAD STUD BOLT TYPE

Falls into open position by gravity.

THE TRADE ARRO MARK LINE OF MASONRY ANCHORING AND DRILLING DEVICES



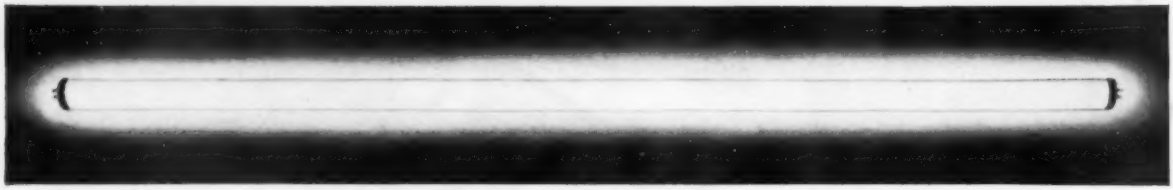
See your industrial, hardware or electrical supplier

TRADE ARRO MARK

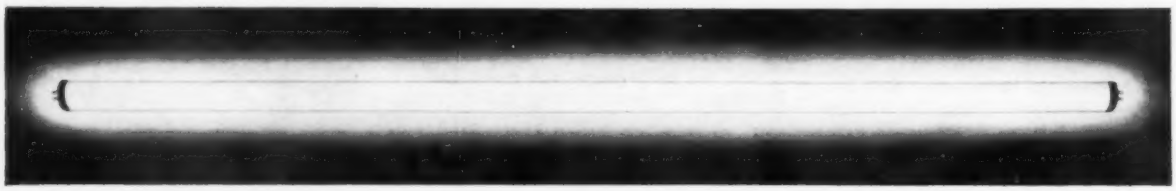
ARRO EXPANSION BOLT COMPANY

DEPARTMENT D, P. O. BOX 388, MARION, OHIO

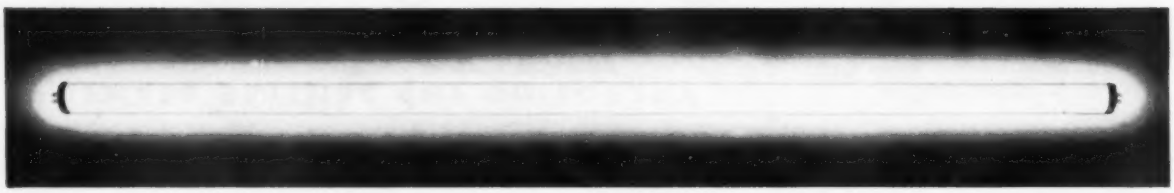
FACT: Westinghouse lamps with



Exclusive "Ultralume" phosphors



give you MORE LIGHT PER FOOT



...MORE LIGHT PER DOLLAR!

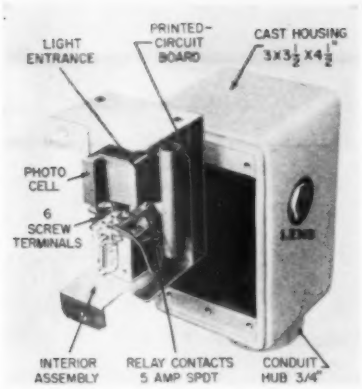
"ULTRALUME"™ phosphors coat the inside of every Westinghouse fluorescent lamp and produce the light you see. "Ultralume" phosphors assure maximum brightness for the life of the lamp. Only Westinghouse has "Ultralume" phosphors.

THAT'S WHY a Westinghouse lamp will give you more light at less cost . . . it takes as much electricity to light a "lazy lamp" as a Westinghouse. And a Westinghouse lamp has a longer brilliant life . . . more light per foot, more light per dollar.

ALL Westinghouse fluorescent lamps have "Ultralume" phosphors . . . there's one for every industrial, business and home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, N. J.

YOU CAN BE SURE... IF IT'S

Westinghouse (W) FLUORESCENT LAMPS



Photorelay (35)

A new printed-circuit photorelay comprises a printed-circuit board held in a sheet-steel cradle which fits into a conventional conduit box of the 1-gang type. Board contains all of the parts on one side, and the etched wiring on the reverse face. Operation is from 100-300 volts 50/60 cycles, and control is from about 10 footcandles of light into the lens. It withstands weather, dirt, vibration, shock, temperature, humidity and voltage fluctuation.

Photobell Company, Inc., 43 Vesey St., New York 7, N. Y.

Recessed Circulating Heater (36)

A new forced draft electric heater with ceiling-height air intake and floor level air delivery is available. Model B has been redesigned and features three-point installation between wall studs. Available in 1600-, 2000-, 3000-, and 4000-watt capacity with single and double outlets.

Electrend Products Corp., State and Water Sts., St. Joseph, Mich.

Aerial Lift (37)

The new "Skyworker 65" hydraulic lift provides a working platform 70 ft above ground for two men. The lift, mounted on a truck platform, can be rotated 370° thus eliminating back-tracking of the truck. Two crow's nests straddle the end of the upper boom and provide considerable safety on vertical and horizontal reaches. Designed, with three jointed booms, specifically for bridge, shipyard, substation, and industrial use.

Emhart Manufacturing Co., Skyworker Div., 83 Ford St., Milford, Conn.

don't guess!
AMPROBE
IT!

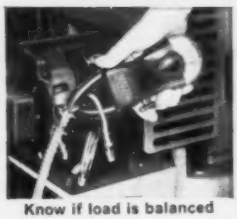


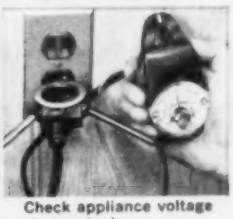
AMPROBE RS-1
only $39.85
with Rotary Scales, has 4 current ranges 0-5/15/40/100 and 2 volt ranges 0-150/600.

There's nothing like an AMPROBE for fast and profitable trouble-shooting. Wrap-around feature makes it simple to read current without shutdowns. Multiple current and voltage scales permit you to test most everything in sight with a single instrument.

There's an AMPROBE for every job, every budget... from 10 amps and 250 volts to 1200 amps and 600 volts A.C. Prices from $19.85 to $67.50—so you can't afford *not* to own one. See them at your jobber today. Pyramid Instrument Corp., Lynbrook, N. Y. Manufacturers of famous REMCON simplified low-voltage switching devices. In Canada: Atlas Radio Corp., 50 Wingold Ave., Toronto, Canada.

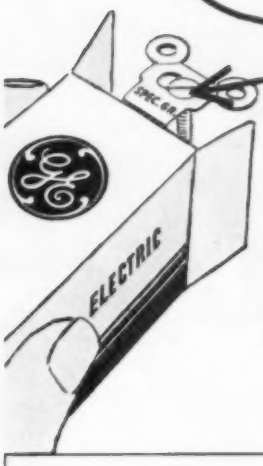
13 models to make your work easier, faster, surer


Know if load is balanced

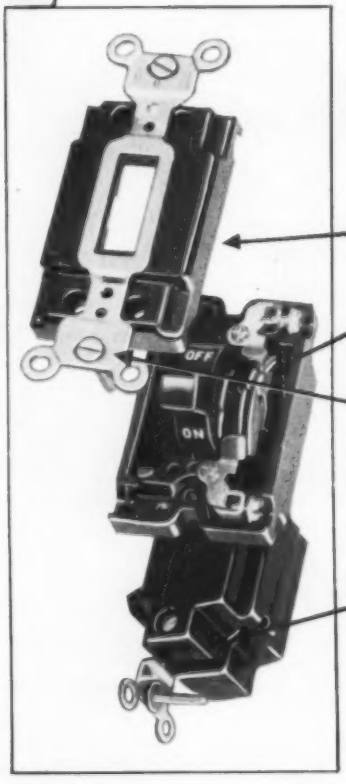

Check appliance voltage at receptacle


Take current readings without shutdowns

SPEC. GR.



This symbol on **G-E Specification Grade Wiring Devices** is your assurance of extra features for handy installation and long, satisfactory service



A close look at the GE5191 Heavy Duty Flush Tumbler Switch will show the high degree of quality you can expect in *all* G-E Specification Grade Wiring Devices.

Switch totally enclosed in sturdy, 2-piece Textolite* housing . . . installs in standard sectional switch box.

Large contact areas and carefully-designed leverage mechanism with kickoff feature, assure positive action . . . easy operation and long life.

Plaster-cleaning mounting screws thread easily into clean or plaster-clogged box ears, and are extra-long (⅞") to simplify mounting when box is set deep in wall. Screws are plated to prevent rust, improve appearance, and assure smooth turning. They are held in the strap by fiber washers (instead of loose in the box) . . . all ready for mounting.

Convenient back-wired pressure terminals provide strong, positive connections.

20A-250V T-rated. Single pole, double pole, and 3-way in brown, ivory and locking-type switches. Also available in 30A-250V T-rated switches. Listed by Underwriters' Laboratories, Inc., meets Federal and REA specifications.

General Electric Specification Grade Wiring Devices contribute to the best reputation of the man who recommends or uses them. Choose from the high-quality G-E line for easier, more profitable, more dependable wiring installations.

General Electric Company, Wiring Device Department, Providence 7, Rhode Island.

*Reg. trade-mark of General Electric

Progress Is Our Most Important Product

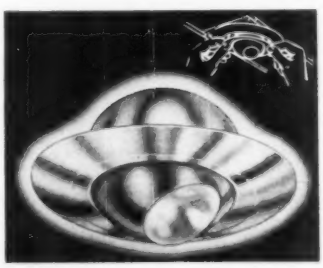
GENERAL ELECTRIC



Closed Circuit TV **(38)**

The new "Vicon" systems feature simplified operation and maintenance. Two cameras are available, the Mark III for manual operation, and the Mark IV designed for remote control operation. Controls for vertical and horizontal movement, focus and iris, and turret rotation for lens selection are contained within the camera to eliminate cumbersome and restrictive attachments. A camera control unit controls the camera and transmits its picture signal to the monitor. Modular construction simplifies maintenance and reduces downtime. Monitors are available in cabinet, rack, and portable models ranging in screen size from 14 to 27 in. Designed for industrial, commercial, and military uses.

Insul-8-Corp., 1369 Industrial Road, San Carlos, Calif.



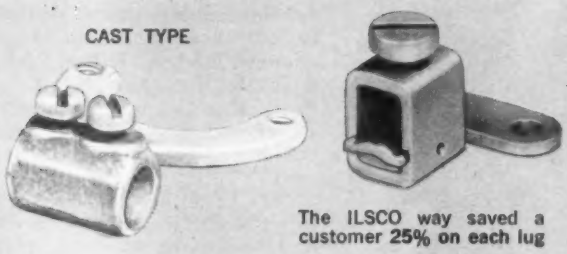
Downlight **(39)**

The new "Satel-Lite" is an eyeball type adjustable hi-hat which uses an R-20 lamp. It features compact size (4 in. diam.), 360° horizontal and 45° vertical adjustment, and easy installation. The hi-hat housing is installed before snapping in the complete eyeball unit, which is held in place by tension clips. Available pre-wired and unwired. Finishes include chrome, polished brass, polished copper plated, white enamel, and grey Hammerloid. Using only 30 watts it is suitable for commercial, industrial, and residential applications.

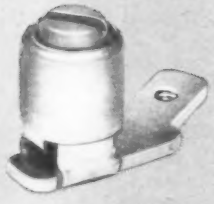
Markstone Mfg. Co., 1531 N. Kingsbury, Chicago 22, Ill.

HERE'S HOW ILSCO CAN SAVE YOU AS MUCH AS $2.25 ON EACH LUG

CAST TYPE



The ILSCO way saved a customer **25%** on each lug



The ILSCO way saved a customer **$15,000** in one year



MACHINED BRASS

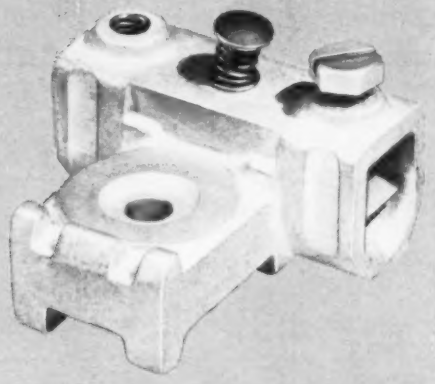
FOLDED TYPE



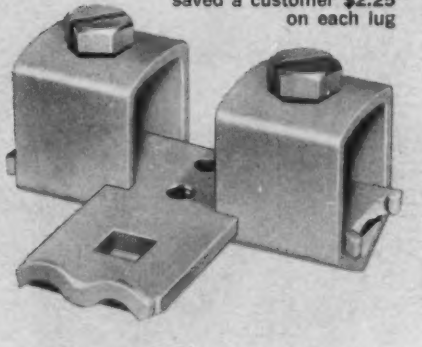


The ILSCO way saved a customer **½ cent each** on hundreds of thousands

MACHINED CASTING



The ILSCO way saved a customer **$2.25** on each lug



Here's conclusive proof that connectors designed and made "the ILSCO way" save you money! Other customers have reported saving up to $50,000 *in one year* through Ilsco's exclusive seamless copper tube method of construction. These tremendous savings were possible because Ilsco lugs are smaller, stronger, lighter . . . requiring less material, and therefore are lower in price.

All Ilsco connectors are made of electrolytic seamless copper, guaranteeing maximum conductivity and low heat rise. Copper is cold worked to retain natural qualities. Each Ilsco connector is compact, light and made to withstand hard usage and abuse. All are UL and CSA tested and approved.

Our complete engineering staff can work with you on specific replacement or development problems. Mail the attached coupon for free samples of connectors made "the ILSCO way" and Catalog #50.

FREE SAMPLES AND CATALOG

ILSCO CORP., 4730 Madison Rd., Cincinnati 27, Ohio
Please send me free samples of ILSCO Connectors and my copy of catalog #50. C-3

Name _____

Company _____

Street _____

City _____ State _____

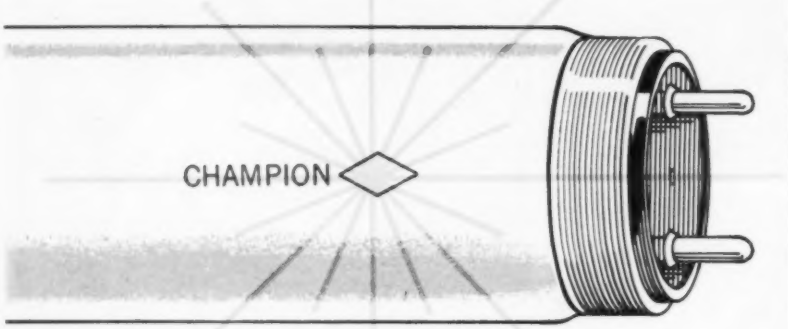
ILSCO
CORPORATION
4730 Madison Road • Cincinnati 27, Ohio U.S.A.
Ilsco of Canada, Ltd., 25 Carson St., Toronto, Ontario

for your best connection



CONNECTORS • NEUTRAL BARS • SOLDERING LUGS • STAMPINGS
TERMINAL BLOCKS • SHADING COILS • WIRE-REINFORCED FUSE CLIPS

bright for life



thanks to **CHAMPION LIGHTMANSHIP**



MILLIONS OF LAMPS A YEAR . . .

ONE PLANT standard of quality control

With all manufacturing concentrated in the big, modern plant shown above, every Champion lamp is subjected to a single, high standard of quality control.

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CHAMPION LAMP WORKS
Lynn, Massachusetts
A division of Consolidated Electric Lamp Co.

CHAMPION Lamps
Incandescent Fluorescent
Your best buy in lamps

Product Briefs

(40) "Shopmate model 520" is a new fully reversible ½-in. electric **drill** developed by Portable Electric Tools, Inc., Chicago, Ill.

(41) New low-voltage portable **light** is grounded for safe operation in wet locations and made by Joy Mfg. Co., St. Louis, Mo. . . . (42) Line of incandescent **fixtures** for commercial and residential use called "Inca-Light" has been announced by J. A. Wilson Lighting & Display Inc., Erie, Pa. . . . (43) Ferry Mfg. Co., Inc., Philadelphia, Pa. offers a new portable clamp-on reflector **light** with red safety cord.

(44) "Thermaline" is a miniature thermal time delay **relay** with high shock and vibration characteristics manufactured by Line Electric Co., Newark, N. J. . . . (45) Ward Leonard Electric Co., Mount Vernon, N. Y. offers a completely new line of standardized **load banks** for obtaining artificial loads. . . . (46) Electric Tube Products, Maspeth, N. Y., has introduced a new UL approved line of concrete-tight conduit **couplings** and **connectors.**

(47) Entron, Inc., Bladensburg, Md., announces the DLX-26 distribution line extension **amplifier** and the RPS-B **remote power supply.** . . . (48) New outdoor wall mounted **lantern** has been introduced by Moe Light, Thomas Industries, Inc., Louisville, Ky. . . . (49) Five new lighting **fixtures** featuring "Luxwood" translucent grained wood, trimmed in brass, have been announced by Thomas Industries Inc., Louisville, Ky.

(50) New G-E NE-2E **glow lamp** with moulded tip permits longer electrodes in smaller bulb, from General Electric Co.'s Large Lamp Dept., Cleveland, Ohio. . . . (51) Inland Ladder Co., Alameda, Calif., has introduced a new **ladder** designed primarily for electricians. . . . (52) Continuous high-speed cutting without overheating is feature of new reciprocating **saw** from Price & Rutzebeck, Hayward, Calif.

(53) Tigerman Engineering Co., Chicago, Ill., offer a complete new line of **annunciators,** which utilize mercury relay contactors. . . . (54) General Electric's Miniature Lamp Dept., Cleveland, Ohio, has announced a new 10,000-watt **spotlight lamp** for TV and motion picture use. . . . (55) A new line of all-nylon **cable clamps** has been announced by Richco Plastic Co., Chicago, Ill.

Fault currents throttled

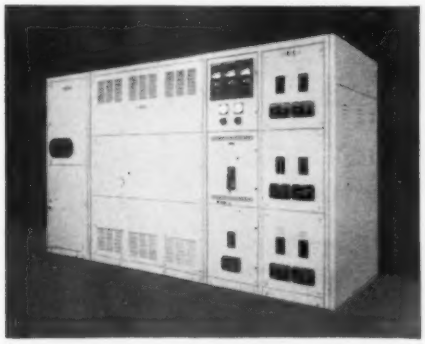
in BullDog Unit Substations

Give your clients the economies of high-voltage distribution and maximum secondary protection with Cordon* breakers in BullDog unit substations. Cordon breakers safeguard circuits *three ways*. Thermal-magnetic action performs in overload and low fault areas. Amp-trap** action limits damaging high fault currents up to 100,000 RMS amperes to low values . . . prevents destruction of equipment by clearing the fault immediately. When any one Amp-trap opens, all breaker poles automatically trip preventing single phasing.

Add to plant safety, economy and production efficiency. Specify BullDog unit substations with Cordon current-limiting breakers. Contact your BullDog field engineer or electrical distributor or write BullDog Electric Products Co., Detroit 32, Michigan.

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**Trade-mark registered by I-T-E Circuit Breaker Company*
***Trade-mark registered by Chase-Shawmut Company*



STANDARDIZED CONSTRUCTION of BullDog unit substations allows for easy expansion. Four frame sizes of the 100,000 RMS ampere IC rated Cordon breaker are now available—100, 225, 400, and 600 amps: 600 volt AC; 250 volt DC.



The current-limiting Amp-traps are accessible from the front of the substation for installation or replacement.

BULLDOG

BullDog Electric Products Co., Detroit 32, Mich. A Division of I-T-E Circuit Breaker Co.
BullDog Export Division: 13 East 40th St., New York 16, N.Y.
In Canada: BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

FRANK ADAM builds COMPLETE ELECTRICAL DISTRIBUTION SYSTEM . . .



The Carillon at Miami Beach, Florida's newest and largest resort hotel
Architects—Norman M. Giller & Associates
Architect on Public Spaces—Melvin Grossman
General Contractor—Cal Kovens Construction Corp.
Electrical Contractor—B & W Electric

Recently Frank Adam Electric Company was awarded the contract to build a complete electric power distribution system for the twenty million dollar 620 room Carillon Hotel, Florida's newest and largest resort hotel located along a 720 foot stretch of Miami Beach's ocean front.

The hotel was scheduled to open December 21, which meant that the necessary equipment had to be designed and produced in record time.

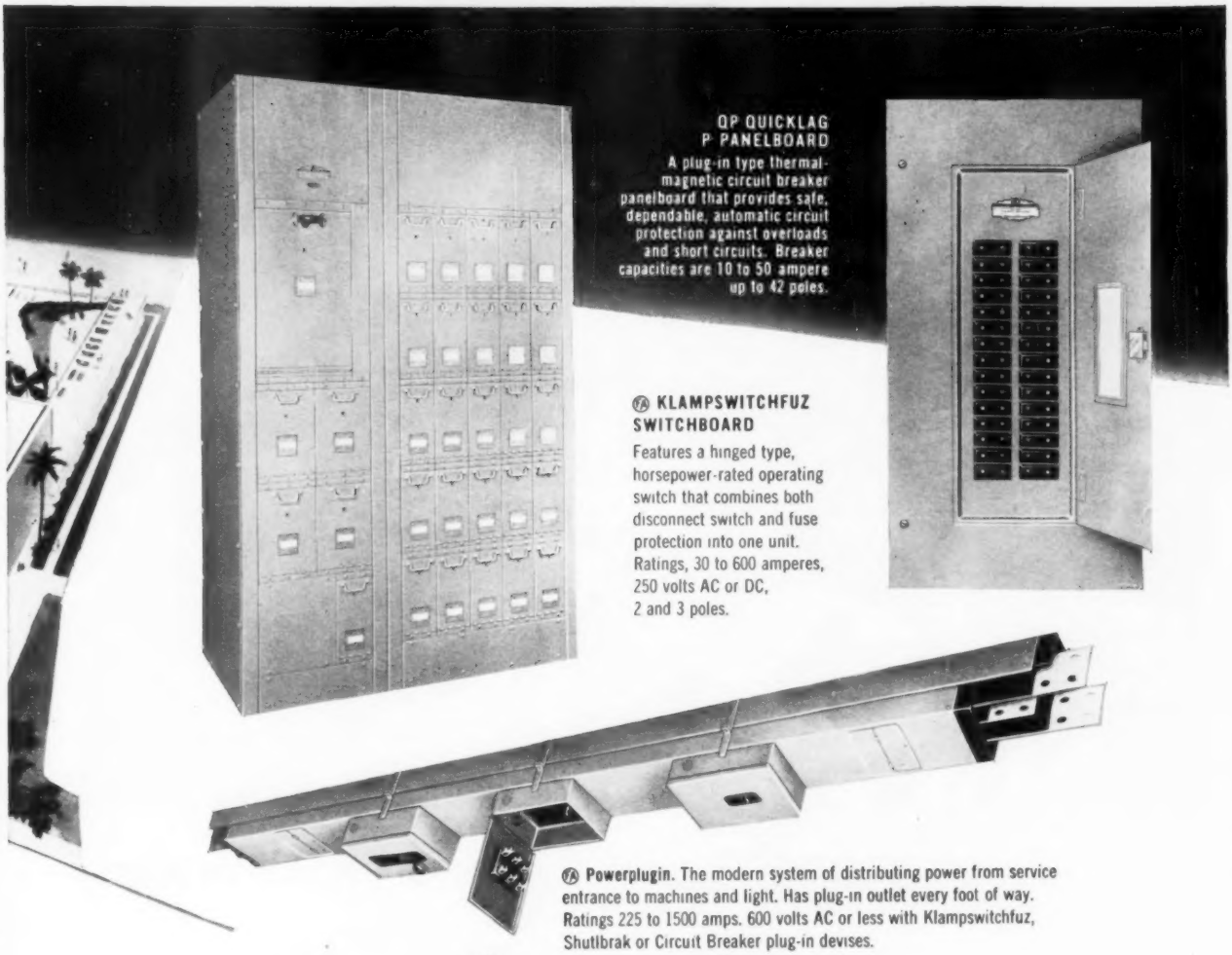
Working closely with the electrical contractor Frank Adam built a distribution system that included two Ⓐ Klampswitchfuz switchboards, Klampswitchfuz power distribution panelboards, Powerplugin busduct and QP Quicklag P lighting panelboards to handle the hotel's heavy load concentration safely, efficiently and economically.

Recommendations of Frank Adam engineers were promptly accepted and the work of assembling the needed equipment was begun. Six days after the final "go ahead" order the last of the equipment was shipped and the hotel opened on schedule.

Designing and producing safe, dependable power distribution equipment for all types of buildings—residential, commercial, industrial and institutional—is a Frank Adam specialty. Include equipment bearing the trade-mark Ⓐ in your next job. Let your nearest Ⓐ Sales Engineer assist you in planning *your* next electrical distribution system. He is listed in Sweets.

for new $20,000,000 hotel in record time!

CARILLON



QP QUICKLAG P PANELBOARD

A plug-in type thermal-magnetic circuit breaker panelboard that provides safe, dependable, automatic circuit protection against overloads and short circuits. Breaker capacities are 10 to 50 ampere up to 42 poles.

FA KLAMPSWITCHFUZ SWITCHBOARD

Features a hinged type, horsepower-rated operating switch that combines both disconnect switch and fuse protection into one unit. Ratings, 30 to 600 amperes, 250 volts AC or DC, 2 and 3 poles.

FA Powerplugin. The modern system of distributing power from service entrance to machines and light. Has plug-in outlet every foot of way. Ratings 225 to 1500 amps. 600 volts AC or less with Klampswitchfuz, Shutlbrak or Circuit Breaker plug-in devises.

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No matter what heating problem you have, there's a dependable Chromalox electric heating unit of the type and size you need.

If you need heat on your production line or for comfort in homes, offices or warehouses, your Chromalox representative is the man to talk to. He has a Chromalox electric heating package ready *now*, with over 15,000 standard types, sizes and ratings, plus a complete range of controls and accessories.

For an on-the-spot heating analysis at no obligation, just call your Chromalox Direct Factory Representative. He's backed by Edwin L. Wiegand Company—the world's largest exclusive manufacturer of electric heating equipment. A call to your "man with the answers" (see listing on opposite page) will put Chromalox Service to work for you.

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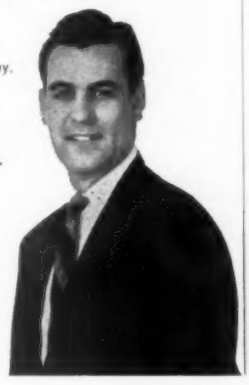
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Catalogs, Bulletins and Engineering Data

(56) HIGH BAY FIXTURES for mercury and incandescent lamps. New 4-page catalog gives complete information, including performance data, on Alzak aluminum and porcelain enamel luminaires. Abolite Lighting Div., Jones Metal Products Co.

(57) ENCLOSED CONDUCTOR SYSTEMS for cranes, monorails and moving machinery. 6-page brochure explains installation and safety requirements of mobile electrification, fully explaining and illustrating Insul-8-Bar system. Pamphlet 8-57. Insul-8-Corp.

(58) SYNCHRONOUS GENERATORS from 30 to 300 kw at 1800 rpm for use with diesel engines. New 10-insert loose-leaf bulletin No. SB-184 shows generator and control cabinets, connection diagrams, and generator and control interconnections. Marathon Electric Mfg. Corp.

(59) LIGHTING TROFFERS. 8-page catalog describes miniature troffers accommodating two fluorescent lamps in either 4- or 6-in. depth. Complete specifications and photos. Alkco Mfg. Co.

(60) SQUIRREL-CAGE MOTORS from 1 to 40 hp. 4-page bulletin SB-1345 describes drip-proof motors with each coil wire sealed in protective plastic. Lincoln Electric Co.

(61) SUBSTATION STRUCTURES installation manual describes simplified method of erecting standardized substation structures ranging from 5 to 131 kv, including basic information on footing and anchor-bolt layouts, grounding, and clearances. Line Material Industries, McGraw-Edison Co.

(62) NUMERICAL POSITIONING CONTROL. 14-page bulletin GET-2676 describes functions of three major elements: data input, director and servo drive. General Electric Co.

(63) SILICONES and dielectric materials. Bulletin 10-105 discusses use of silicone products in applications ranging from electric motor insulation to intricate electronic control systems. Dow Corning Corp.

(64) OUTDOOR STATIONS. Bulletin GEA-5573B, 20 pages, discusses integrated stations rated 7.5 to 230 kv from plans to final installation. Includes charts, pictures, line connections and standard dimensions. General Electric Co.

(65) INSULATION. 32-page guide book and catalog contains physical and electrical properties, suggested applications and application procedures for complete line of electrical tapes and epoxy resins. Minnesota Mining and Mfg. Co.

(66) PYROMETERS. Bulletin GEA-6650, 8 pages, emphasizes such design features as printed circuits, lead length compensation and flexibility. General Electric Co.

(67) POLE-MOUNTED CAPACITOR rack assemblies. Features, ratings and dimensions are outlined in catalog PC4, 16 pages. Includes equipment rated 300 to 750 kvar at phase-to-phase voltages of 2400 delta to 13800 grounded wye. Line Material Industries, McGraw-Edison Co.

(68) LIGHTING FIXTURES, commercial and residential. 4-page catalog includes ceiling units, pull-down fixtures, wall bracket, rigid stem and cord fixtures, plus new glass designs. EJS Lighting Corp.

(69) CARTRIDGE FUSES, plug fuses, clip clamps, fustats and midget renewable fuses are pictured and described in new 8-page catalog Form 48. Monarch Electric Corp.

(70) SOLDERING IRONS. 8-page bulletin GED-3553 describes complete line, explaining such features as calorized and ironclad tips and heaters. General Electric Co.

(71) FLUORESCENT LAMP BALLASTS. New data book contains information on circuits, ballast construction, supply voltage and frequency, radio interference, ventilation and cold weather operation. Advance Transformer Co.

(72) ELECTRICAL SUPPORTS. Two new bulletins 550 and 560 describe new system of supporting lighting fixtures, conduit, cable, bus bar, bus duct and cable trays. Power-Strut, Inc.

MONOTUBE
Floodlighting Poles

proved by experience

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If you are planning the development or modernization of sports, recreational, commercial or industrial areas, Monotube floodlighting poles will help you make full use of nighttime hours.

Available in heights up to 100 feet, Union Metal Monotube poles are designed, engineered and produced by a company specializing in pole manufacture for more than half a century.

Monotubes offer attractive appearance, exceptional strength, minimum maintenance, quick and easy installation . . . *and no guying* required.



To learn more about Monotube floodlighting poles, steel or aluminum, write to The Union Metal Manufacturing Co., Canton 5, Ohio for catalog information. In Canada: The Union Metal Manufacturing Company of Canada, Limited, Bramptop, Ontario.

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(73) INTERLOCKED ARMOR CABLE bulletin, 12 pages, describes 600-volt, 5000-volt, 15,000-volt grounded neutral and 15,000-volt ungrounded neutral cable. Rome Cable Corp.

(74) UNDERFLOOR DISTRIBUTION. 16-page catalog 857 describes power raceway system for industrial and commercial buildings including 8 pages of dimensional drawings. Walker Bros.

(75) LARGE INDUCTION MOTORS in ratings from 150 to 1250 hp are treated in 16-page bulletin 1950. Cutaway drawings show drip-proof, splash-proof, enclosed and explosion-proof enclosures. Louis Allis Co.

(76) OVERHEAD LINE CONNECTORS. Comprehensive 100-page manual on connection techniques, connectors, and installation tooling. Burndy Corp.

(77) POWER ROOF VENTILATOR GUIDE, bulletin 2301, pictures and describes both supply and exhaust units. Dimensions, capacity tables, and details on accessories and protective coatings are included. Ilg Electric Ventilating Co.

(78) COORDINATED STARTERS for low-voltage motors up to 600 volts, 1500 hp, 3-phase. 8-page bulletin GEA-6584 discusses starters, contactors, overload relays, and accessories. General Electric Co.

(79) PUMP MOTORS, from ½ to 1000 hp, are discussed in new 4-page bulletin B-2507. Reliance Electric and Engineering Co.

(80) SCHOOL LIGHTING essentials are discussed in new non-technical outline, "What to Look for in School Lighting", including such basic factors as efficient illumination and economics of lighting fixture selection. Garcy Lighting.

(81) LIQUID RHEOSTATS. Two new bulletins, GEA-6664 and GET-2740, discuss applications to provide stepless secondary control of high-horsepower wound-rotor motors and describe operating characteristics in various applications. General Electric Co.

(82) BRUSHES for welders and portable electric tools are cataloged in two new publications, catalogs 87 and 97, respectively, for identifying brush requirements. Helwig Co.

(83) AUTOMATIC CONTROL equipment. New 64-page catalog 18 gives detailed information, technical data and prices on transfer switches,

The only Fuse with the **HEART** TO GIVE COMPLETE PROTECTION



ECON®
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The heart of the unique 2-way protection found in Econ Dual-Element Fuses is the exclusive Econ-Alloy thermo element. This unique fuse provides you with "timed" protection against overloads (up to 500%) and instantaneous breaking action on shorts.

Dual-Element Fuses have been specifically designed and engineered for use in motor, branch and feeder circuits. They save time and money where you have frequent power surges such as on high starting torque motors . . . often by-pass the need for expensive circuit breaker equipment.

Dual-Element Fuses are available in sizes from 2" up to 13⅜"; 0 to 600 amps; for 250 and 600 volts; in both knife blade and ferrule types. Underwriters' Laboratories listed.

Write for ECON Dual-Element Catalog S-60 . . . or literature on all Economy Fuses.



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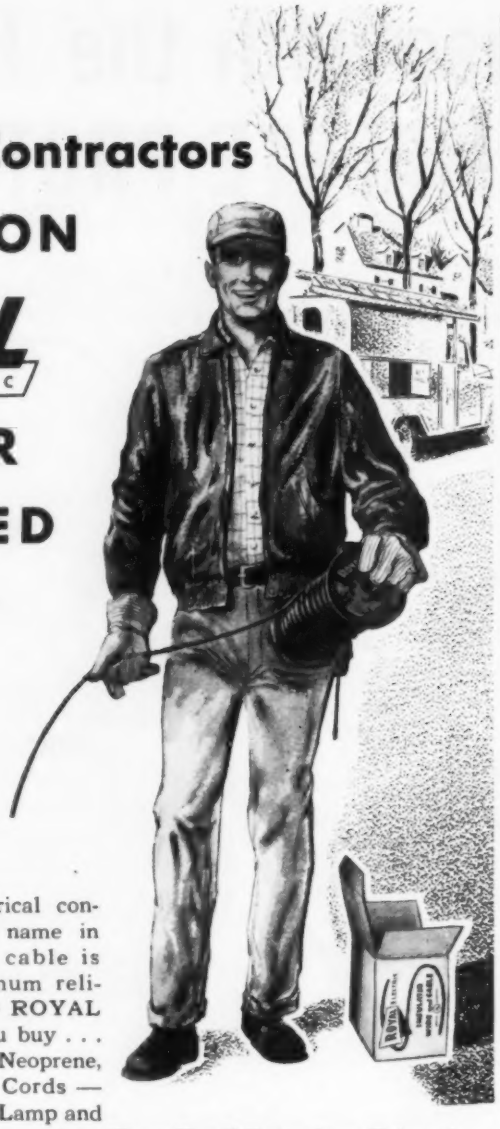
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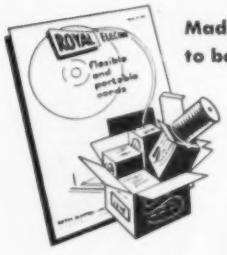
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contactors, special controls and timing devices. Zenith Electric Co.

(84) SURFACE-MOUNTED LUMINAIRES less than 3 in. deep are featured in 8-page bulletin O. Shadowline units are available in 4-ft and 2-ft squares and 2- by 4-ft, 1- by 2-ft, and 1- by 2-ft rectangles. Bulletin shows all details of construction and installation. Pittsburgh Reflector Co.

(85) MOTOR ENCLOSURES for hazardous locations plus similar enclosures for magnetic starters are described in new 6-page bulletin giving complete pictorial instructions on how to install the units. Square D Co.

(86) HEATING CABLE. Revised bulletin 19-457 contains up-to-date information on five types of cable for such applications as pipe heating for industry, commerce and around the home and snow melting for both heavy- and light-traffic areas. General Electric Co.

(87) SAFETY SWITCHES. 4-page bulletin describes Isoline switches for use as motor-starter switches or as enclosed circuit breakers for any machine equipment in ratings of from 30 to 600 amps, 120 to 480 volts. Electric Distribution Products Inc.

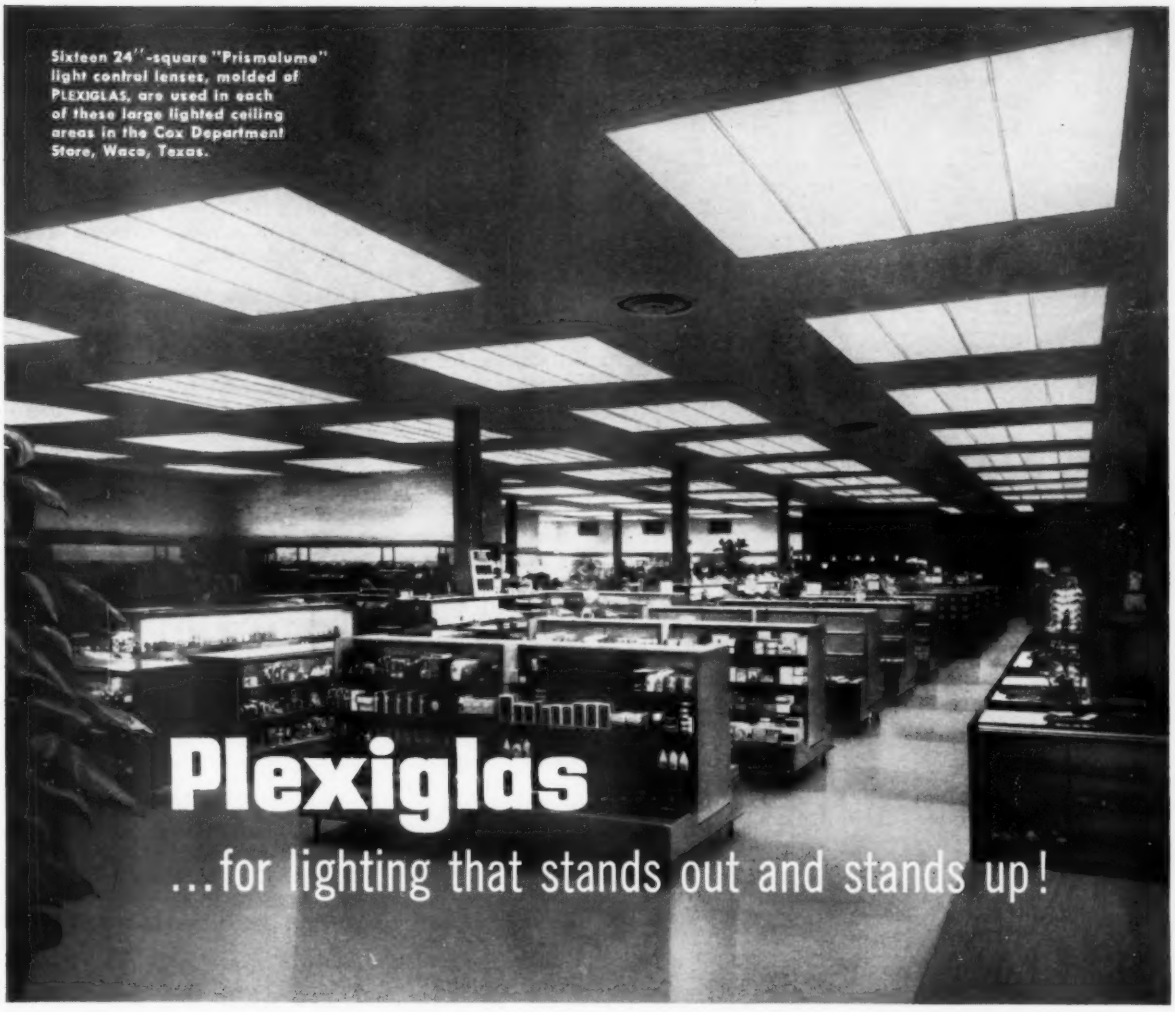
(88) MOTOR FRAME SIZES. New Compar-A-Frame bulletin B-1284-1 gives NEMA frame assignments and overall dimensions of ac motors in new NEMA frame sizes from 364U to 445U. Hard-cardboard chart is punched for easy insertion in notebook. Reliance Electric and Engineering Co.

(89) LIMIT SWITCH applications are illustrated and described in new issue of Uses Unlimited, Vol. 11, No. 2, including new plug-in limit switch which can be replaced on a machine in seconds. Micro Switch.

(90) DRAFTING BOARD which permits large drawings to be pushed under front edge of board to facilitate working on upper half of drawing is described in 2-page bulletin. Zee Co.

(91) INDUCTION MOTORS. Two 2-page product sheets 1300-PRD-230 and 1300-PRD-244 describe in detail squirrel-cage motors rated from 60 through 4000 hp with speeds from 450 through 1800 rpm. Electric Machinery Mfg. Co.

(92) DISCONNECTING SWITCHES. Bulletin GEA-6716, 8-pages, describes basic data on three types of outdoor hook-operated switches. General Electric Co.



When a store and its merchandise appear in a good light, the result is more sales. PLEXIGLAS® acrylic plastic gives highest efficiency in transmission of light . . . yet has low surface brightness that reduces reflections and distractions. It is clean and attractive . . . enhances the most modern interiors. And PLEXIGLAS is strong and durable, resists breakage and discoloration, can be handled and cleaned easily. We'll be glad to furnish names of companies who manufacture lighting equipment that includes PLEXIGLAS lenses or diffusers.

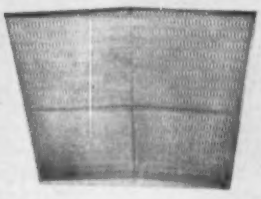
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LIGHT CONTROL LENSES —molded of clear PLEXIGLAS, provide a high level of prismatically controlled light with complete visual comfort, plus beauty and safety overhead. Light in weight. Can be mounted in multiples to form large luminous areas.



PAN-TYPE DIFFUSERS —formed of white translucent PLEXIGLAS, provide low surface brightness, reduction of shadows and soft overall diffused lighting.

SOCKET HUNTING



CORD STRETCHING



are "evils" millions of people will read* about in Plugmold advertising. Naturally we're telling them how you can eliminate such irksome problems forever with Plugmold. Yes, the crusade is on and it will grow—the chance to lead is yours.

*Saturday Evening Post
Time
House Beautiful's Building Manual
House & Garden's Book of Building
Home Modernizing
New Homes Guide



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THE WIREMOLD COMPANY
Hartford 10, Connecticut

(93) CLOSED CIRCUIT TV systems are described in 6-page bulletin V-1-58 which gives data on Vicon cameras, control, monitors and accessories. Insul-8-Corp.

(94) AIR-BLAST BREAKERS. Bulletin GEA-6644, 12 pages, discusses application in metropolitan power systems where trend toward higher distribution voltages exist. Breakers are rated 34.5 kv, 1500 mva, 1200 or 3000 amperes. General Electric Co.

(95) BATTERY CHARGERS for 12-volt electric industrial trucks. Bulletin AR-100/58 covers use, design and construction of new line of AutoReg silicon chargers rated for use on 115 volts, 60 cycles, single phase. C & D Batteries, Inc.

(96) DISCONNECTING SWITCH. Bulletin GEA-6397, 8 pages, provides basic data on new high-voltage disconnecting switch for sectionalizing and isolating service. RF-2 is rated 69 kv HD through 345 kv, 600, 1200, 1600 and 2000 amps. General Electric Co

(97) STATIONARY BATTERIES for auxiliary power, control, emergency lighting, police and fire alarms, railway signalling, switchgear and telephone use are described in new 12-page catalog GB-1783. Gould-National Batteries, Inc.

(98) ELECTRIC BRAKES. Bulletin GET-2770, 8 pages, provides detailed technical data on application of ac and dc brakes, including 16 performance curves. General Electric Co.

(99) VARIABLE SPEED DRIVE package which has no tubes, brushes or commutator is discussed in bulletin 1257-1. Speed is controlled by signal from ac tachometer in motor to magnetic amplifier, which varies input voltage. Fidelity Instrument Corp.

(100) FLUORESCENT LIGHTING. GEA-6441A, 4 pages, discusses fluorescent lighting for residential streets, primary and secondary traffic streets, highways, underpasses, shopping centers, parking lots and other areas. General Electric Co.

(101) ELECTRIC UNIT VENTILATOR which supplies heat and natural cooling and ventilates with fresh outdoor air in such installations as schools, churches, stores and auditoriums is described in new bulletin 980B. Edwin L. Wiegand Co.

(102) STATIC SPEED CONTROL. 4-page bulletin GEA-6275A describes control for paper machines, including a simplified diagram of a static excitation circuit. General Electric Co.

(103) BLOWERS. Catalog 215 covers construction, ratings, performance data tables, dimensions and specifications for various types of direct drive AMCA-rated blowers. Peerless Electric Co.

(104) SEMICONDUCTOR POWER RECTIFIERS. Bulletin GEA-6375A, 12 pages, discusses both silicon and germanium power rectifiers for electrochemical processes, aluminum and copper production, electroplating, anodizing and steel process lines. General Electric Co.

(105) VARIABLE SPEED DRIVES. Bulletin 195-1-58 illustrates several Speed-Trol motor applications with complete ratings. Sterling Electric Motors, Inc.

(106) SEMICONDUCTOR RECTIFIER power conversion systems. Bulletin GEA-6684, 16 pages, discusses use of systems, describing four methods of meeting dc power requirements for electrolytic processes. General Electric Co.

(107) CONDUCTOR ENCLOSURES. New catalog CBW6 contains photos, dimensions and other specifications of line of cutout boxes, pull boxes, transformer cabinets, and wireway and fittings. Huenefeld Co.

(108) CONTROL CABLES. 4-page bulletin 19-467 gives detailed information on the construction and application of polyethylene Flamenol control cables for wet or dry locations, aerial or direct burial. General Electric Co.

(109) CAST-ALUMINUM HOUSINGS of weather-proof and explosion-proof design. Bulletin 158, 16 pages, lists each type of housing together with photographic, dimensional and written data plus how-to-order information. Adalet Mfg. Co.

(110) DISTRIBUTION EQUIPMENT. New catalog GEC-1032B contains 144 pages of information on low-voltage distribution equipment and components, including switches, breakers, service entrance equipment, lighting and distribution panelboards, wireway, switchboards, control centers, substations and busway. General Electric Co.

(111) DISTRIBUTION SWITCHBOARD which accepts any combination of six different types of protective devices. 32-page catalog GEA-6627. General Electric Co.

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While the changes in the new Allen-Bradley Bulletin 712 and Bulletin 713 starters may be relatively minor, they were made in your interest—to give you the best control on the market.

The new operating lever has been attractively restyled and structurally improved. Now the disconnect switch can be locked "open" or locked "closed"—with three padlocks of any kind. For the maintenance engineer, a concealed latch pin is built into the lever, which permits opening the door of the cabinet without opening the disconnect switch and stopping the motor. The door can also be padlocked shut independently of the operating lever.

With the disconnect lever in the "off" position, the cabinet door can be opened. At a glance, it can be seen that the movable contacts are open. An added "safety" feature—the incoming line connections are covered with an insulating plate to prevent accidental contact.

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Size 1—to 7½ hp, 220 v; 10 hp, 440-550 v.

Size 2—to 15 hp, 220 v; 25 hp, 440-550 v.

Size 3—to 30 hp, 220 v; 50 hp, 440-550 v.

Size 4—to 50 hp, 220 v; 100 hp, 440-550 v.

3-58-MR

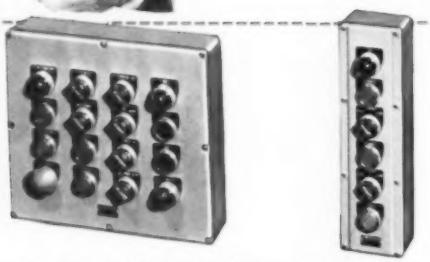
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Bulletin 800T Oiltight Control Stations. Available in from one to sixteen units, in die cast aluminum enclosures.



Bulletin 802 Precision Limit Switch, with oil-tight head and body.



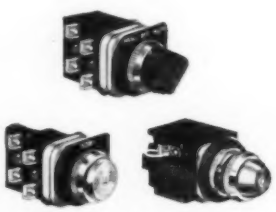
Bulletin 805 Foot Switch. In rugged die cast enclosure for the toughest service.



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Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

Plant Equipment Grounding

QUESTION L33—Is it good practice to ground steel framing of the plant, as well as instrument casings and transformer tanks, etc., on the same ground bus as generator neutrals?—G.J.P.

ANSWER TO L33—It is good practice to ground steel framings, instrument casings, and transformer tanks, etc., on the same ground bus as generator neutrals. This prevents a high potential from existing between steel framings and ground during faults-to-ground of the power system. If steel casings are not grounded to the same bus as generator neutrals, then dangerous potentials will exist that will cause insulation breakdown of transformers and instruments. These high potentials may be caused by unequal loadings on the phases or on phase being opened, or even during switching.—W.E.G.

ANSWER TO L33—The best practice in establishing a system of grounding for an industrial or electrical utility plant is to bond all structural steel framing, motor and generator frames, transformer tanks, switchgear enclosures, water piping systems, etc., solidly to the plant ground mat and thence to earth. This procedure assures that all metallic surfaces will remain at the same relative potential in the event of a phase-to-ground fault or a lightning stroke to the building structure. The result of this interconnection is the virtual elimination of the hazard of electric shock to operating personnel. It should be kept in mind that grounding conductors should be of adequate size to carry ground fault current and to have sufficient mechanical strength. It is also desirable to provide enough grounding electrodes or a sufficient buried mat to result in a ground resistance of 10 ohms or less. However, in cases where low grounding resistance cannot be achieved, the potential of the entire plant may rise above absolute ground zero voltage by several hundred volts without incurring a safety hazard because all metallic surfaces will have the same relative potential.

Grounding all equipment together will also assure an adequate flow of fault current to permit fast, reliable relaying. Additional material on this subject is contained in AIEE Committee Report No. 953 dated October, 1956.—L.D.B.

Wound-rotor Motor Current

QUESTION M33—We have in our plant a 900-hp, 4160-volt, 3-phase, 60-cycle wound rotor motor driving a compressor in our food freezer plant. The load on this motor fluctuates widely, and sometimes rapidly. Visual inspection of the rotor and rotor resistors indicates definite overload, yet the stator current does not verify this condition.

We would like to know if there are any instruments with which we could measure the rotor currents and also the power developed in the rotor, keeping in mind that the rotor frequency varies from 60 cycles at standstill to a few cycles at full speed. Further, we would like to know the method necessary to accomplish the above.—J.M.

ANSWER TO M33—About the best way of measuring this sort of thing is with a high speed direct writing pen recorder. There are several types that are suitable.

Inasmuch as the input power requirements for the recorder are quite small, ranging in the order of millivolts, it will be necessary to couple a suitable transformer to the current leads of the rotor. If a current transformer is used, it is essential that the current transformer be loaded on the secondary side with an appropriate resistor—otherwise serious errors will occur, as well as possible high voltages. The writer had occasion to do an analysis of the operation of a punch press motor during its cycle of operation. I used such a high speed recording system, together with a current transformer suitably loaded down, and was able to get a very interesting set of curves. A careful analysis of the resulting record will show, not only the variations in magnitude of the current, but also the variation in speed, inasmuch as the instantaneous frequency of the current can be ascertained from the chart by referring directly to the time scale on the paper. Such an analysis will prove very worthwhile, and give you a clear indication as to what is happening. If a four-channel recorder is available, then the current to each phase of the rotor can be individually measured, and the fourth channel can be used for any other purpose, such as the line voltage or with a suitable transducer the actual load or torque.—H.H.S.

ANSWER TO M33—The fluctuations in the operation of the load on a motor driving a refrigerating unit are so great that possibly only some type of curve drawing chart meter will give reliable information. The current in the wound rotor circuit can be obtained by using a "clip-on'" type of ammeter which can be used without disconnection of leads. The same type of meter can also be used for the 4160-volt supply circuit. With this information the motor manufacturer can give definite information about the power developed by the rotor. Actual test using a voltmeter, ammeter and wattmeter, with suitable potential and current transformers in the motor circuit makes results for this type of load uncertain.—C.O.D.

Ground Wires

QUESTION N33—In our plant distribution system, conduits have been considered satisfactory as a means of grounding utilization equipment in accordance with the National Electrical Code. We have been told, however, that certain other plants install a green ground wire inside the conduit from equipment back to the panel and then to ground. Can someone explain whether this is a necessary or desirable arrangement?—R.G.O.

ANSWER TO N33—In plant distribution systems of any size, the use of a ground wire, inside the conduit, from equipment back to ground will materially improve the effectiveness of the grounding system. This eliminates the possibility



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Exclusive Sylvania reflector fluorescents give you more profit ...give customers more light at no extra power cost!

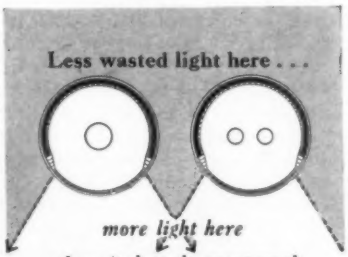
MORE LIGHT . . . aimed right where it does the most good. That's the built-in sales appeal of Sylvania's new reflector fluorescent lamp—the lamp that's stepping up lighting levels in stores, offices and plants of all types . . . and boosting profits, too.

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Sylvania's internal reflector reduces the light-stealing effect of dust and grime on top surfaces of lamps. It lets lamps maintain high output from cleaning to cleaning. And—because they don't depend on the ceiling as a reflecting surface—Sylvania internal-reflector fluorescents help stretch out painting schedules.

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of sparking between imperfect joints and provides a lower impedance than the conduit itself, thereby improving the operation of ground relays or overcurrent tripping devices. Reference is made to AIEE Paper 54-244 on this subject. —R.R.M.

ANSWER TO N33—The NEC allows grounding by means of the conduit or raceway. However, if good grounding is considered vital, it is wise to include a bare or green wire. Long Wiremold runs, runs of armored cable, runs having many boxes or connections, underground runs, old conduits, conduits in corrosive atmospheres, may all have considerable resistance. It may be enlightening to try to blow a 5-amp fuse, by grounding a 110-volt circuit to the end of a long run of conduit. Many times, the fuse will not blow; other times the fuse will blow with sparking at a connection. Including a grounding conductor will eliminate the possibility of a poor ground.—J.P.L.

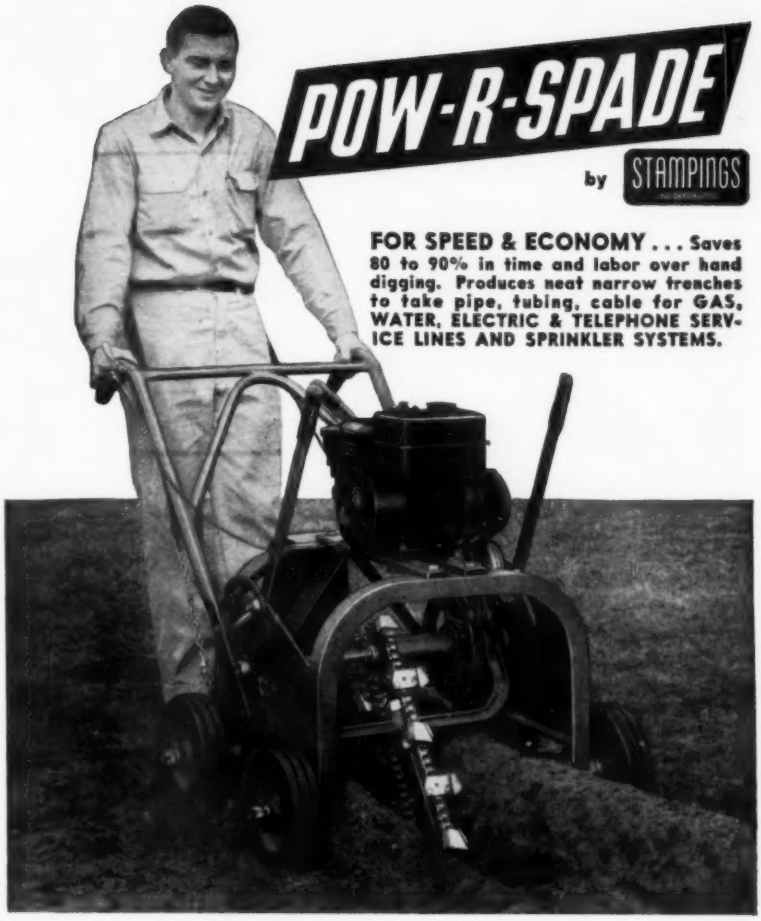
ANSWER TO N33—If you were to use conduit as the ground, the National Electrical Code specifies that you would have to bond around each union, also around flex to motor, if flex is used. Lock nuts must be used on each side of the junction boxes. It is much easier and a more positive way of grounding by including a separate green ground wire.—E.H.

Breaker Ratings

QUESTION P33—On an installation we are planning, we are going to have a molded case circuit breaker, 3-pole frame L 600 amps. We will use the above on a 208-volt, 3-phase, 4-wire system. When checking the interruption rating of this circuit breaker, the Underwriters rate it at 10,000 amps, while the NEMA rating is 50,000 amps. Why is there such a great difference in the two ratings for the same breaker?

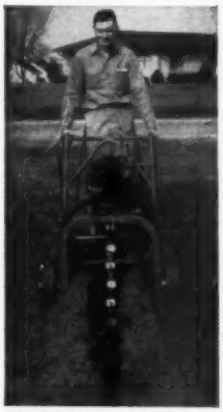
Is the above circuit breaker suitable for the main breaker if it is fed by three 25-kva transformers on 208 volts, 3-phase, 4 wires?—M.D.

ANSWER TO P33—Underwriters' Laboratories 10,000-amp interrupting requirement for an L-Frame 600-amp molded case breaker is a minimum performance requirement to meet compliance with Underwriters' Laboratories Standard No. 489 for these breakers, for appli-



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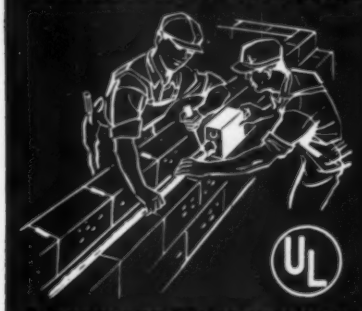
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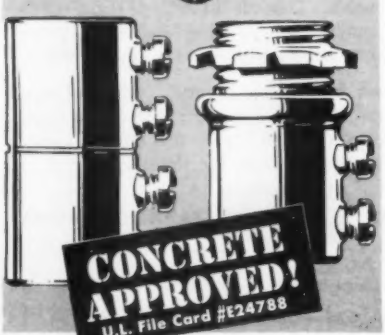
1½" and 2" SIZES

Now... ETP's U.L. approved fittings are available in an even greater size range. For safe, quick installations that are U.L. approved as Concrete-Tight – that cannot rust or corrode conduit – always specify ETP.

- *Pre-set and staked screws. No backing out to insert conduit.*
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- *Extra heavy duty Locknut and heaviest gauge wall thickness.*

Also available in ½", ¾", 1" & 1¼" sizes (one screw type).

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SAMPLE & BROCHURE ON REQUEST

ELECTRIC TUBE PRODUCTS

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cation in accordance with the National Code requirements.

The NEMA 50,000-amp interrupting rating is the more realistic actual performance rating of the breaker's capacity, based on the NEMA test procedure and applicable duty cycle. NEMA requirements are outlined in NEMA Publication AB1-1955.

This specifies that circuit breakers shall also meet the requirements of the Underwriters' Laboratories standard for circuit breakers. The difference between UL and NEMA ratings is that the Underwriters' is a minimum requirement, whereas the NEMA rating is more nearly the ultimate interrupting capacity of the device.

The L-Frame 600-amp molded case breaker is suitable for the main breaker of a circuit fed by three 25-kva transformers on 208 volts 3-phase 4-wire. The maximum available short circuit current at the secondary of such a transformer bank would be 12,400 amps with unlimited primary capacity, neglecting motor contribution, and 12,900 amps with 50% motor contribution. A motor contribution is the feedback that would occur if motors were connected and operating on the secondary of the circuit at the time of the short circuit. Actually, a J- or K-Frame would have enough interrupting rating and current carrying capacity for this size transformer bank, unless installations or continuous load conditions preclude their use. Molded case circuit breakers operate instantaneously without time delay on short circuit, and if selectivity is an object, such as with other breakers in feeder circuits, consideration might be given to the AK1 type breaker, as the main, which provides selectivity and time delay on short circuit operation.— R.R.M.

ANSWER TO P33—If the L-Frame molded case circuit breaker is manufactured in accordance with NEMA standards it will have an interrupting rating of 50,000 rms asymmetrical amperes at 240 volts. NEMA standards require a circuit breaker to be tested to prove this rating. The test duty cycle is an open operation plus 15-second delay (or time to reset thermal trip) plus a closed and open operation at full rated voltage and with the rated current available at the line terminals for a 3-phase circuit. After this test, the circuit breaker will be in substantially the same condition electrically and mechanically as before the test. While the

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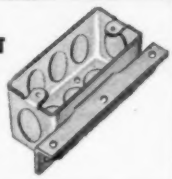
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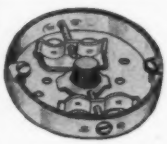
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1⅞" deep.—Made with new type angle bracket for quick, accurate installations.

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When you have an installation problem not covered by our standard line, our engineers will design special units to your specifications.

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L. C. Marschall, Executive Vice President, discusses the general management viewpoint at Sola on "conservative design"

"Anything less than CBM ballast standards is unacceptable at Sola"

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At Sola, however, we go even further. We design an adequate margin of performance into each unit over and above the CBM minimum specification. Extra iron, copper, and reserve tolerance in each component —the conservative design of Sola ballasts — assures *quality exceeding* the CBM standard.

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Every Sola general lighting ballast, for which a CBM specification exists, is a certified CBM ballast. We refuse to market anything less.

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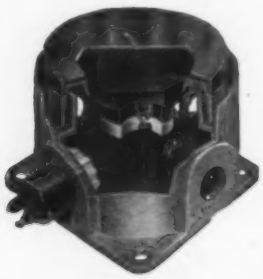

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That is why "Latrobe" Products are so quick and easy to install—so efficient in service.



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Adjustable Floor Boxes are bonded which makes them fire-proof—come in single round or square bodies—also furnished in square single gang, two gang, three gang and four gang types.

Non-Adjustable Floor Box

Represents the last word in unique design, neat appearance, fewest number of parts, and least amount of labor to install.





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Fasten porcelain or glass insulators to steel framework without punching holes. 4 sizes—1", 1½", 2" and 2½".

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This clamp is made with a double safety bite of case hardened tool steel. Two models—Right Angle and the Parallel support. Each model comes in 10 sizes to handle pipe or conduit ½" thru 4".



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ADJUSTABLE FLOOR BOXES
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circuit breaker you buy will not have had this test made on it, a circuit breaker of identical design and manufacture had to satisfactorily pass this test.

For a circuit breaker to be approved and labelled, the maximum interrupting capability required by UL is 10,000 rms asymmetrical amperes. This does not mean that the circuit breaker will not be capable of interrupting higher currents as required by NEMA standards.

This L-Frame circuit breaker will certainly be adequate as a main circuit breaker for this application. However, the full load current available from a 3-phase connected bank of three 25-kva single-phase transformers is 208 amps so a smaller KL-Frame size circuit breaker might be used. This would depend upon the size of the trip unit and its size would depend on the load or the magnitude and time duration of overload the transformers would be permitted to carry, the ambient temperature, the enclosure, the selectivity desired with respect to the feeder breakers and meeting the National Electrical Code requirements for a main secondary breaker.—D.L.J.

ANSWER TO P33—In reference to the first part of the question as to the difference in NEMA and Underwriters' ratings, the answer is simply that the Underwriters' does not test breakers for interrupting capacity above 10,000 amps. Their rating, therefore, indicates only that the breaker has been tested at 10,000 amps.

As for the second part of the question, the breaker is suitable for the main secondary breaker of the three 25-kva transformer bank as it fulfills the requirements for transformer overload protection and short circuit interrupting capacity. Calculations show the secondary full load current to be approximately 210 amps; and since L-Frame breaker trip elements range from 125 to 600 amps, a trip element can be selected. The exact rating depends upon system design requirements, but should not exceed 250%. Incidentally, in this case, the primary feeder would be considered sufficiently protected by an overcurrent device set at 600% (of the rated primary current).

To confirm that the breaker in question can be applied insofar as IC is concerned, it is calculated that, based upon the secondary voltage, transformer impedance is approximately 2.8% and assuming an infinite primary short circuit capacity, the maximum short circuit current at the secondary terminals is in the neighborhood of 9800 amps. With an IC of 50,000 amps the L-Frame breaker is quite ample. —J.C.

Can You Answer These QUESTIONS

QUESTION Z33—Our paper mill is located at the end of a long transmission line. On holidays our plant is shut down except for lighting and emergency pumps. When the plant is down, the voltage on our transformers rises 25%. We have a reactive volt-ampere meter on the primary side of our main transformer bank. What should the kvar of an idle transformer bank be at 75%, 100%, 125% voltage? The transformer bank is a 1000-kva setting, 2400 volts to 440 volts, 3-phase. —MD.

QUESTION A34—In our plant we have 3-phase 440-volt motors that operate in warm locations. The thermal overcurrent devices for these motors are located in cooler places. Will motors operating in warm locations pull more current than motors operating in normal locations?—L.R.S.

QUESTION B34—What is the correct capacitor size to be used on specific motors for starting purposes? I have reconnected a 3-phase (220-440) motor to run single phase on 110-220 volts. It draws 4.5 amps on 220 single phase. I wish to use the capacitor in the starting winding only. Starting winding has only one-half the groups the running winding has.—E.H.

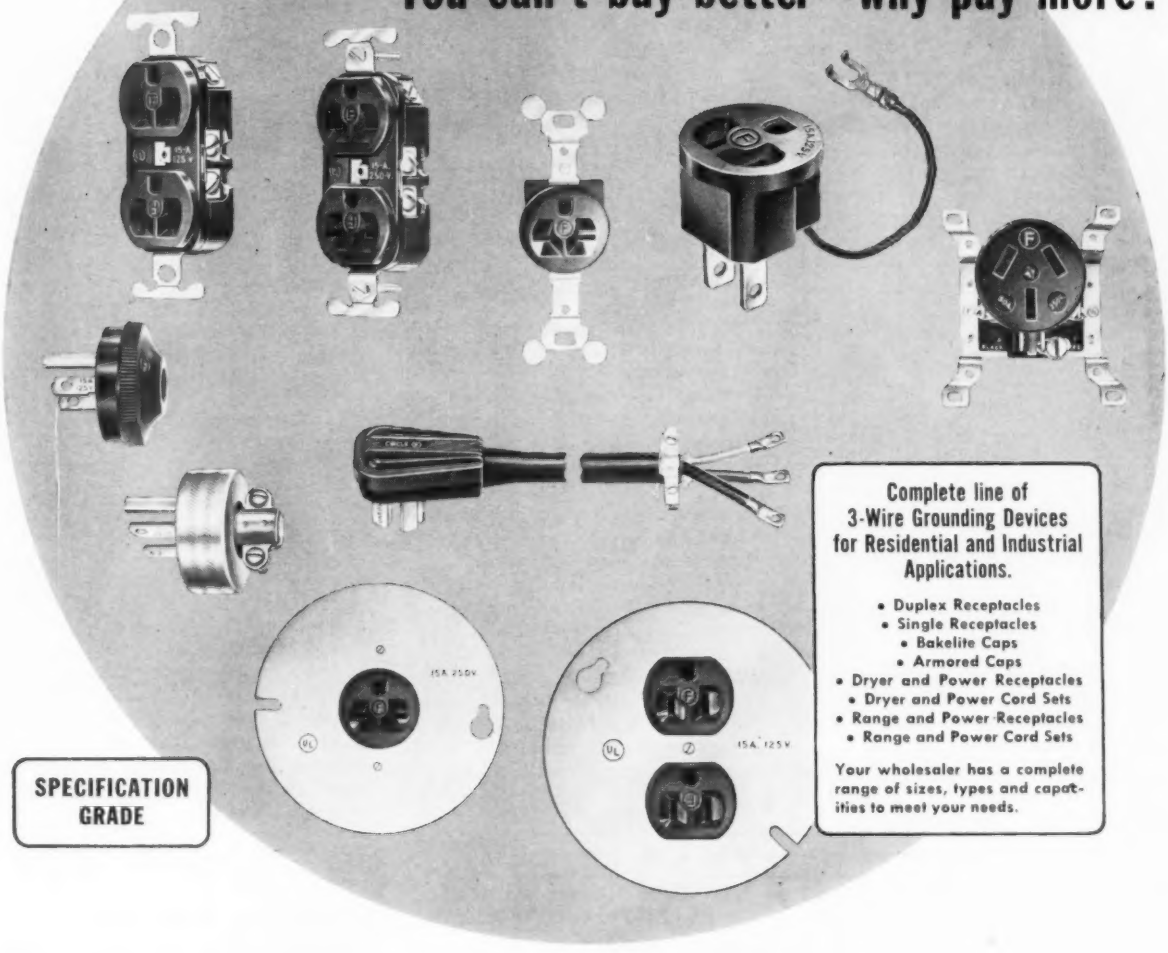
QUESTION C34—What voltage is impressed on motors to determine a good test potential, or is a test potential determined by the input voltage of a motor?—E.H.

QUESTION D34—In a recent job that was put in service, we had to insulate Type R 500 MCM's with asbestos tape and paint the asbestos with soda of silicate. The wires are in troughs and in a very hot room. What is the purpose of soda-silicate?—V.S.

PLEASE SEND IN YOUR ANSWER BY APRIL 15

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Questions on the Code

Answered by:

B. A. McDONALD, *New York Board of Fire Underwriters, Rochester, N. Y.*
GLENN ROWELL, *Electrical Engineer, Fire Underwriters Inspection Bureau, Minneapolis, Minn.*
B. Z. SEGALL, *Consulting Electrical Engineer, New Orleans, La.*

Grouping Motors on One Branch Circuit

Q. *Is it correct that an arrangement of two magnetic motor controllers cannot be paralleled on the same line, as items 2 and 4 are in the sketch below?*

As I understand the code, only two motor controllers that are approved for group fusing can be paralleled. A short investigation shows that no manufacturer makes a magnetic controller approved for group fusing. If group fusing is desired as shown on the sketch, then manual starters must be used. Are these conclusions correct?—G.W.F.

A. In order to clarify the problem presented, I have added a few computations to your diagram, which shows two motors connected to one branch circuit, one a 5 hp and the other ⅓ hp. Such a combination of circuit loading is subject to the provision of Section 4343-b which requires each motor to be protected as follows:

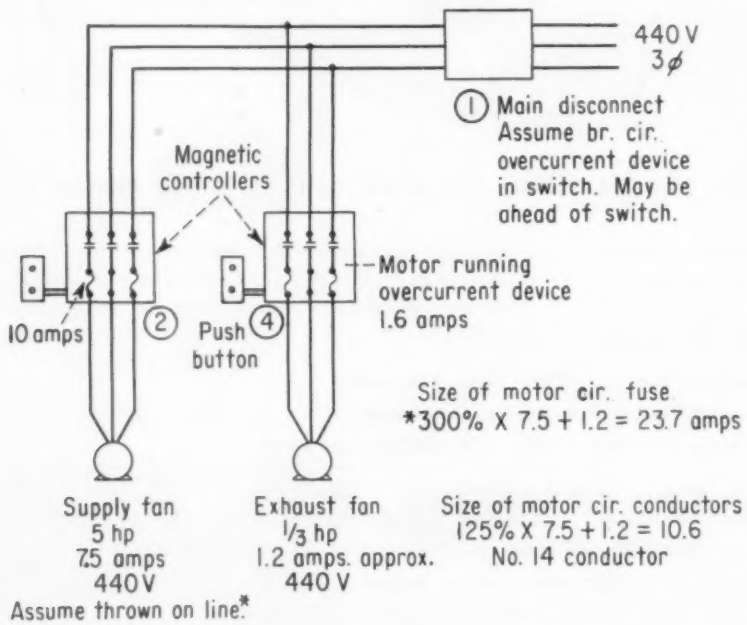
1.—Each motor-running overcurrent device must be approved for group installation.

2.—Each motor controller must be approved for group installation.

There are three other qualifications which must be satisfied but we will not repeat them here since all five provisions must be satisfied in the case presented.

While the Underwriters Laboratories' list several manual motor controllers approved for group installation or group fusing that satisfy the above two provisions, it appears that there is only one manufacturer who has UL listing for a magnetic controller approved for group fusing. See page 153 of the UL Electrical Construction Materials List.

The hazard involved concerns the size of the fuse back of the motor-running overcurrent device. Ordinarily the fuse should not be greater than four times the rating of the motor for which they are designed, unless approved for group installation, see Section 4330. In the case of the ⅓ hp motor shown on your diagram the fuse back of the thermal cutout is about 24 times greater than the rating of the motor. While the thermal overcurrent device will protect the motor from gradual overload, we have no assurance that the motor will be protected on short circuit.—B.A.McD.



Instrument Panel

Q. *We were recently called in to do some work in a plant where hexane is used to extract oil from soybeans and while all the electric light and power work that we or others have done is of the type approved for hazardous locations, we were much amazed to note that their instrument panel mounted in this extraction room had many devices on it which consisted of pressed metal enclosures. Is not the use of such instruments within such an area a violation of the code?—M.C.A.*

A. Not necessarily so, as it is possible today to pressurize with a small amount of air taken from a clean source through a bellows actuated switch, control instrument panel with three or more pounds of air pressure which will preclude the possibility of any explosive vapors or gases entering those enclosures. Then the opening of any of these enclosures for the purpose of changing charts will cause the bellows actuated switch to open all power circuits extending to such a panel. Recognition of such an installation may be found under Section 5001 in the first fine print note.—G.R.

Grounding Outdoor Lighting Standards

Q. *Reference "Housing Project" Page 232 October. If the outdoor lights were served by phase-to-neutral on a grounded neutral system, would not the neutral conductor serve for grounding the standard, and if so would this conductor have to be an insulated No. 6 under Section 2592 of the code?—A.C.W.*

A. The original question published in the October issue of E.C.&M. concerned the grounding of outside ornamental lights installed on a housing project, and the answer advised that such outdoor standards must be grounded and that a third wire, a grounding

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conductor, must be used for this purpose. To satisfy this code requirement, it was necessary to run a 3-wire Type UF cable instead of the 2-wire cable specified.

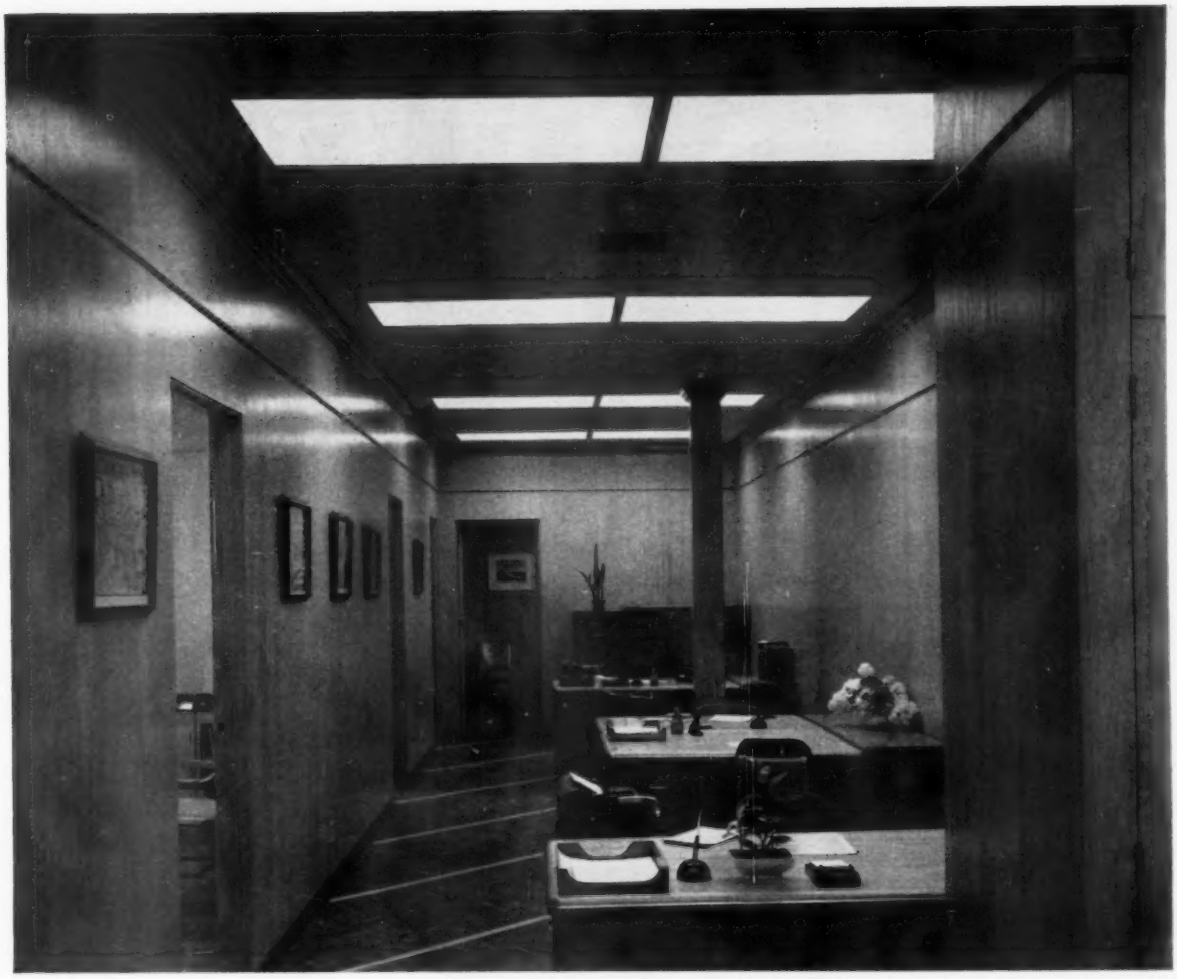
In answer to your question the neutral grounded conductor of the circuit feeding such standards can not be used for grounding the standards. Section 2561 covers this point, and also recognizes exceptions for ranges and clothes dryers and when special permission is given by the authority enforcing the code. See Sections 2557 and 2560.

Section 2592 advises that grounding conductors smaller than No. 6 shall be in conduit, electric metallic tubing or cable armor. This rule applies to the grounding conductor installed at the service entrance referred to as the system or common grounding conductor. Section 2592-b covers the grounding conductor for equipment, such as the standards in question and advises that the grounding conductor may be smaller than No. 6 when it is run so as to be not subject to mechanical injury. When the grounding conductor is run in a cable assembly such as Type UF cable it is not considered to be subject to mechanical injury since the code does not recognize the use of such cable when exposed to mechanical injury. According to the provisions of Section 2595 the grounding conductor used on a 20-amp circuit could be as small as No. 16 when part of an approved cable assembly.—B.A. McD.

Autotransformers

Q. *If a building is served from a 208-volt, 4-wire, wye connected secondary, will the code permit the use of an autotransformer to supply a circuit to which is connected a 230-volt, 3-wire, 3-phase, electric motor load?—S.L.L.*

A. While it is true that an Official Interpretation based on Section 2003 of the code states that an autotransformer cannot be used to supply 230-volt, 3-wire service from a 208-volt, 4-wire, wye connected secondary when that service supplies branch circuits as described under Article 210, it is also true that Article 210 does not cover motor circuits as Section 2125 states very definitely that if circuits supply only motor operated appliances, Article 430 is to apply. Under Article 430 there is no apparent prohibition which would prohibit the use of an autotrans-



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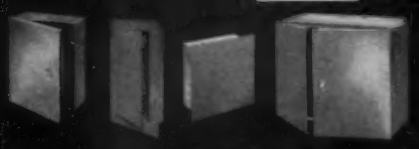
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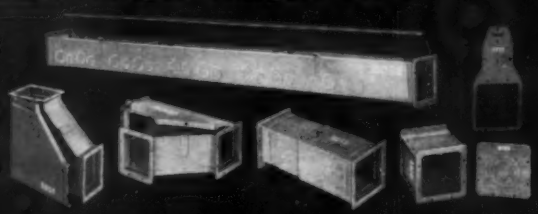
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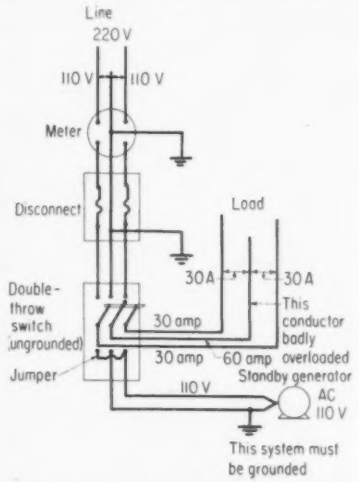
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former to supply 230-volt, 3-wire circuit from an installation which was supplied by 208-volt, 4-wire, wye connected secondary. Of course such a circuit could in no instance be used to supply conventional branch circuits to which other loads were attached.—G.R.

Double-Throw Switch Used for Standby Service

Q. *The illustration below shows a 110-volt ac standby generator to be used in the event of a power failure. Would this be in*

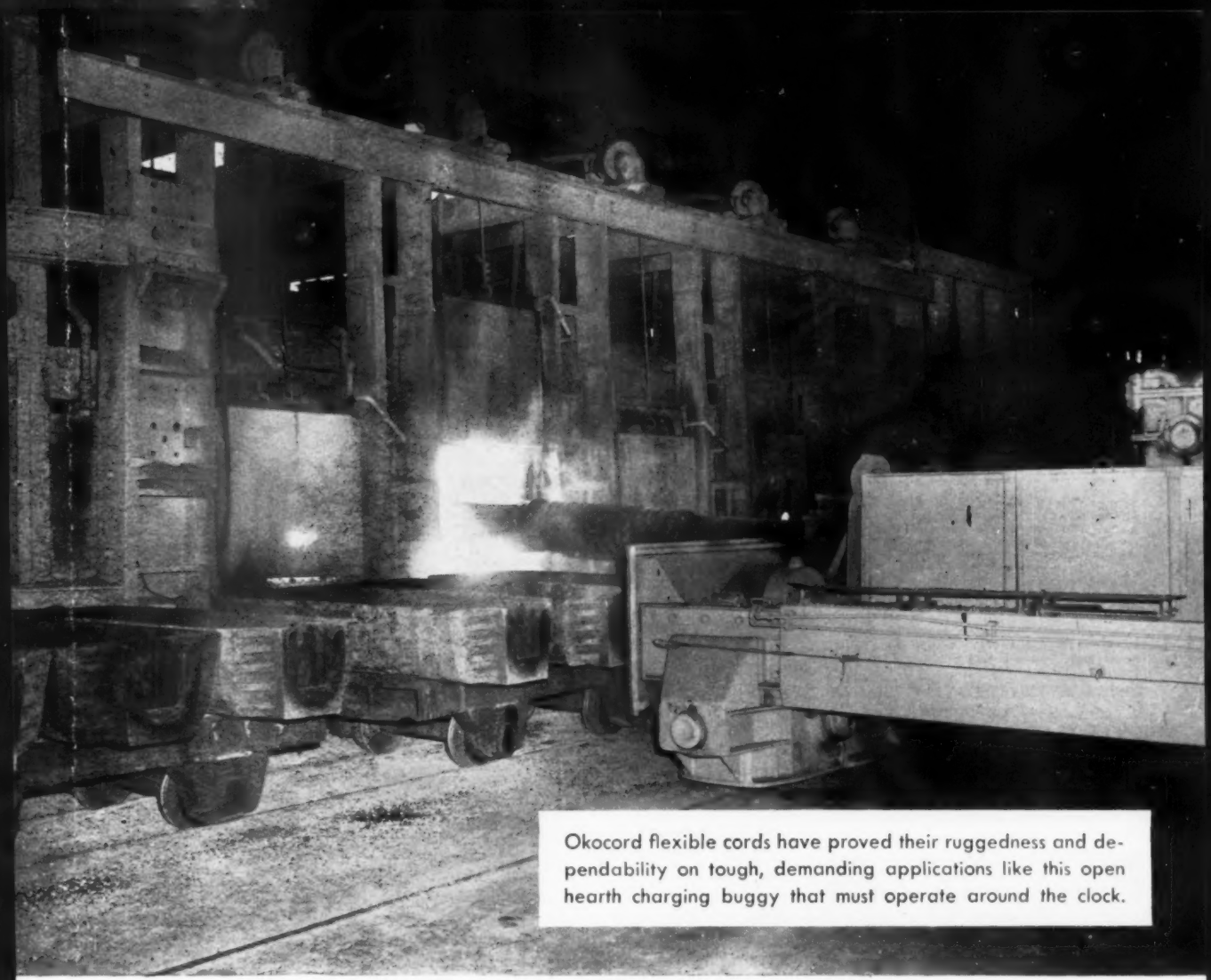


violation of the code, providing the line and load were in separate conduits? Should the double-throw switch be grounded? This hook-up to be used on meter supplied by REA. The inspector has informed us this could not be used. Please clarify.—D.H.

A. It appears to me that there are three code violations involved with your proposal to install an isolated source of power to be used in the event of failure of normal power supply. I list them as follows:

The 110-volt system derived from the standby generator must be grounded. I have shown same on your diagram.

The single phase, 2-wire emergency system cannot be connected to the 3-pole, double-pole switch as shown, since the load on the neutral of the 3-wire feeder will greatly exceed its current carrying capacity. As an example, I have shown on your diagram a 30-amp load connected between the live legs of the feeder and the neutral. A current of 60 amps would flow in the neutral.



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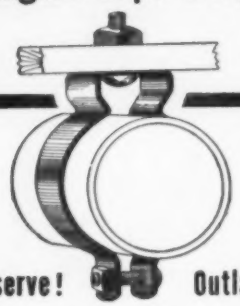
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Section 3806 requires a double-throw knife switch mounted in a vertical position to be provided with a locking device which will insure the blades remaining in the open position when so set. Past experience indicates that a switch in the open position as shown in your diagram may, by the force of gravity, close the circuit to the generator.—B.A.McD.

Wiring Varnish Pump House

Q. *I have a question on the sketch below. The pump house contains 7½ hp motors of the explosion-proof type, driving pumps used to unload Formar varnish from a tank car. The varnish is low in solvent and must be steam heated to pump well through the hoses and pipes. Based on Section 5125 of the N. E. Code which deals with more dangerous gasoline, and Section 5015, will you kindly answer the following questions:*

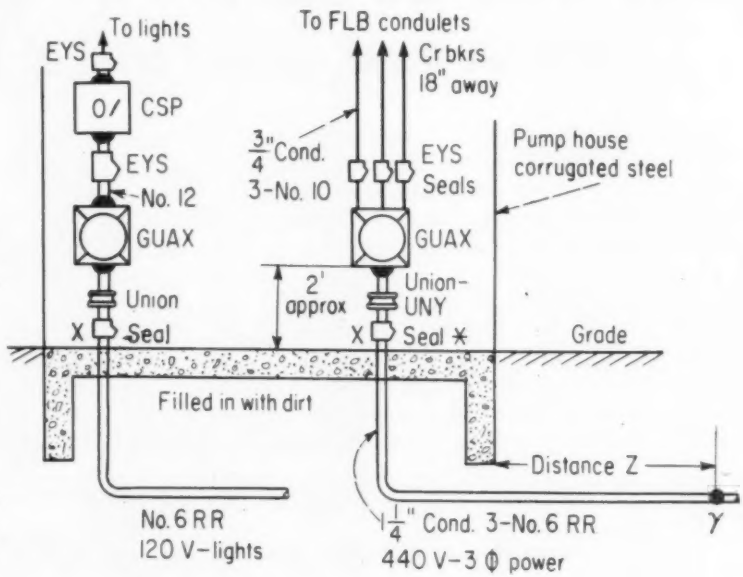
1—The power source to this subservice is 125 ft and consists of three No. 6 RR conductors in 1¼-in. conduit. Is an additional seal required at point "X" where the conduit enters the pump house or at point "Y" underground? (Sections 5015-a-2 and 5125-b-1-3-4.)

As the hazard appears to be less than gasoline and the only leakage could be from valves or pumps, since there are no storage tanks in the building, I think that the distance "Z" could be as little as 5 or 10 ft outside the wall. Strictly by the letter of (Section 5125 b3 and b4) it should be 25 ft out. I can see the validity of the requirement if the conduit ran to some building but here it terminates underground and an explosion therein could do no harm.

2—Since there are less than six motors and circuit-breakers to protect them, I think no main explosion-proof circuit-breaker is required. The power is 440 volts, 3-phase. Three explosion-proof lights and a receptacle are served by a CSP Arktight receptacle and switch, in a twin EFD condulet assembly and fed by another line just like the motor feeder. Voltage drop requires No. 6 wires which are spliced in the GUAX fitting to No. 10 for motors and No. 12 for the lights and receptacle.—R.W.K.

A. From the information submitted, I do not believe that the provisions of Section 5125 apply to the pumphouse under discussion. This section of the code treats with bulk-storage plants which are defined as locations where gasoline or other volatile liquids are stored in tanks having an aggregate capacity of one carload or more, and from which such products are distributed (usually by tank truck). In the case presented we have a pumphouse used exclusively for pumping varnish (lacquer) from a tank car to some form of container either inside or outside of other buildings located on the property involved. I do not believe that this application comes within the scope of a bulk-storage plant as the term is generally understood.

I, personally, believe that this varnish pumphouse would be classified as a Class 1, Div. 1 location as



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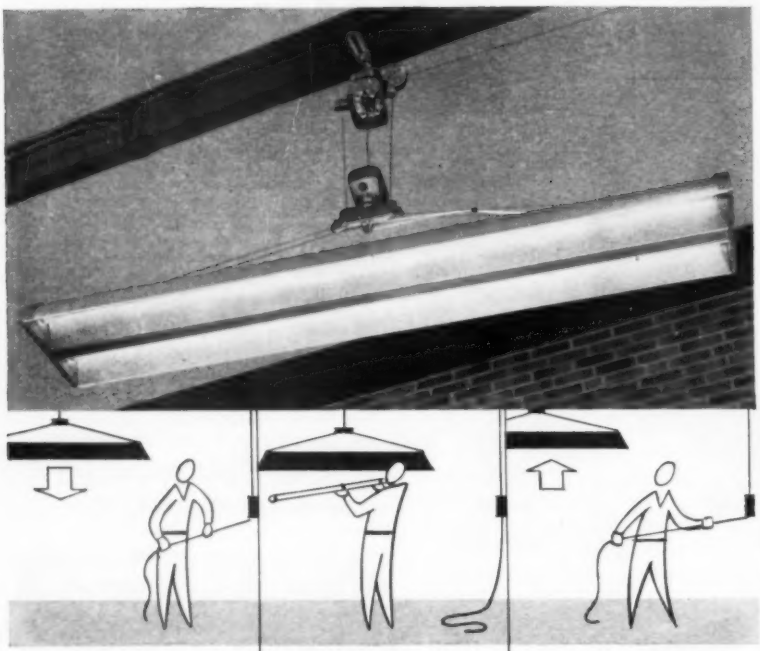
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covered by Section 5004-a, and would be subject to the pertinent rules of Article 500. On the basis of this opinion a seal fitting definitely would be required at the points marked "X" where the conduits enter the pumphouse. This is the point where the conduits leave a Class 1, Div. 1 location and enter the ground which is considered to be a non-hazardous location.

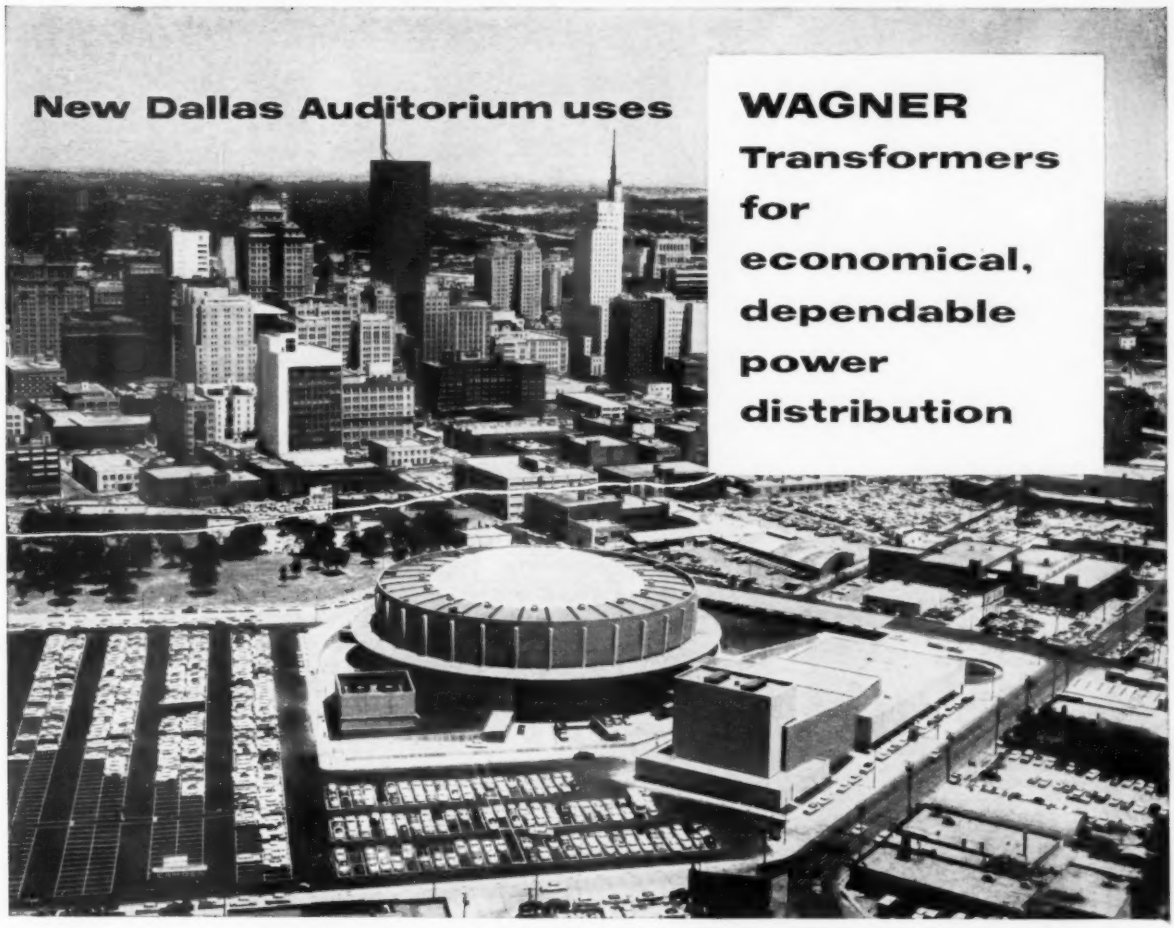
I do not see how the 25-ft rule of Section 5125-b-3 and 4 applies, and even if it were involved, there is no provision classifying the underground area as a hazardous location and there would be no occasion to install a seal fitting at the point marked "Y". The fact that Section 5125-e recognizes the use of an underground cable approved for the purpose, not protected by conduit, as an underground wiring method for bulk-storage plants, appears to confirm this opinion.

As a result of the foregoing, the varnish pump house is a Class 1, Div. 1 location and all electrical wiring and equipment installed in same must be approved for such a hazardous location (explosion-proof). Since the code does not specifically cover the area adjacent to the pumphouse, its status is questionable, and the authority enforcing the code may decide that the hazardous area extends to a distance of 5 to 20 ft or more around the pumphouse. The code delegates this responsibility for determining the hazardous area to the electrical inspector, and his decisions are influenced by the many variable factors which may be involved.

According to the provisions of Section 2351-d, which I assume pertains to the installation under discussion, I do not believe that each one of the feeders must have a disconnecting means where they enter the building, provided such a disconnect is located in another building on the same property and is accessible. The fact that there are less than six disconnects also would be considered as satisfying the provisions of Section 2351-d.—B.A. McD.

Comment

The NEC now *recommends* a 100-amp minimum residential service. It has been proposed that the rule be made mandatory in the next revision. George Andrae, electrical contractor of Milwaukee, a leading



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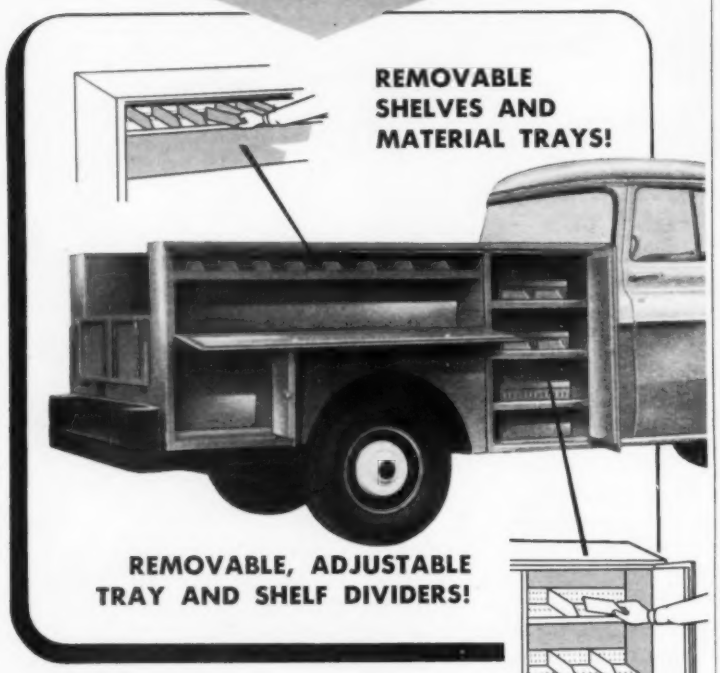
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authority on the code, backs the proposed change in the following letter to O. K. Coleman, chairman, Code Panel No. 3, and suggests that others who may be interested add their support by expressing this opinion to Mr. Coleman, P. O. Box 705, Lafayette, Ind.

"25 years ago we wanted to require services of No. 4 minimum in our Wisconsin State Electrical Code, but that move was blocked by an official of a combination gas and electric utility, probably to protect their investment in an obsolete gas plant.

"Ten or more years ago when we wanted to require No. 6 minimum in the National Electrical Code, we were given the tearful picture of some elderly widow scrubbing floors for a bare existence and living in one or two rooms, who should not be forced to spend money for an unneeded service entrance. My answer at the time was, that the widow's daughter probably got married to someone who bought her an electric roaster the next Christmas, only to find she couldn't use the roaster because of the small service entrance. You can use essentially the same electrical appliances in a 2-room cottage as in a 10-room house.

"Over a period of time the National Electrical Code has gradually changed from purely a fire code (of limited scope) to include requirements for adequacy, as a means of preventing hazardous conditions and fires. While we know the code is a minimum standard and not a specification, it is not regarded as a minimum by people generally but as an implied guaranty of an adequate installation. It behooves the industry leaders to whom the making and revising of code rules is entrusted, to anticipate the requirements of present day users of electricity and not lag too far behind the times.

"To say that this is not a function of the code but more of a promotional job, is dodging the issue. Most electrical contractors do not sell appliances and cannot do much promotional selling because it costs too much. On the other hand, improved insulation and some code concessions have made the installation of a 100-amp service less costly. Thirty years ago I installed a 100-amp service in my own home and this required three No. 1 wires in 1½-in. conduit. Today we can use No. 3 RH in 1¼-in. conduit for 100-amp, or three No. 4 in 1-in. conduit for 85 amps. On old residences this could be done in a great many cases

ONE SOURCE FOR EVERY INDUSTRIAL LIGHTING NEED!



SOLID NECK LINE Sturdy, attractive one-piece units provides quality illumination at low cost for **Factories** and **Warehouses.**



"FLO-LINER" Smartly styled shallow lighting units for any **Commercial** or **Office** installation.



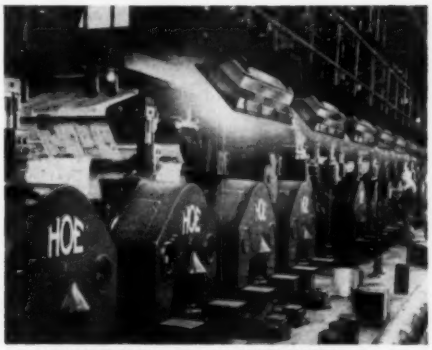
"BI-FLO UPLIFTER" 72% downlight — 28% uplight, provides greater seeing comfort for industrial areas such as **Assembly Lines.**



"D" LINE High efficiency, all-purpose fixtures with upward component of light to relieve severe brightness contrast. Ideal for **Machine Shop** and **Factories.**



DURATACH LINE Rugged fixture that offers easy, low cost maintenance plus complete interchangeability. Widely used in **Industrial** and **Textile** plants.

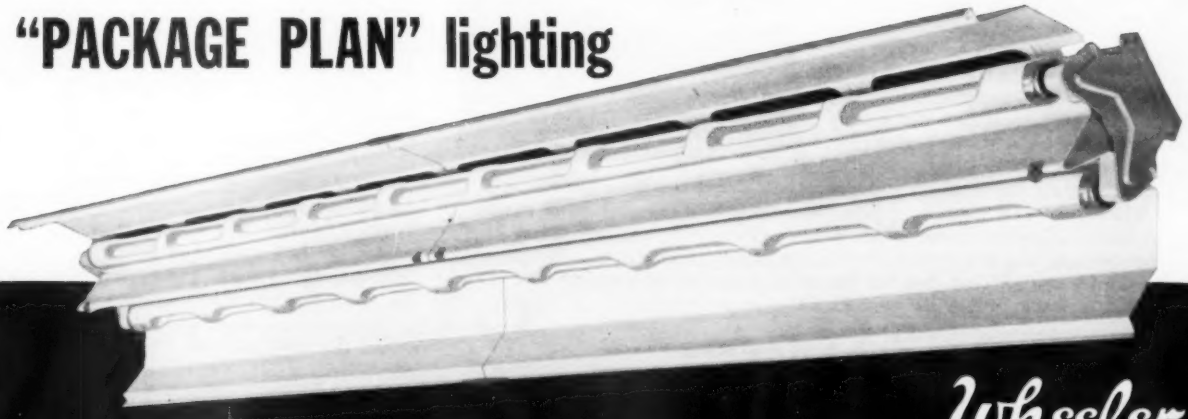


"DUST-TIGHT" and **"VAPOR-TIGHT"** Specialized fixtures for hazardous and non-hazardous locations such as **Printing Plants, Flour Grain Mills, etc.**

and now Power-Lume

latest addition to *Wheeler*

"PACKAGE PLAN" lighting



Power-Lume by Wheeler — a new fixture in 2 types of Construction "F" and "V" . . . specifically designed to utilize fully the extra illuminating power of the new Power-Groove lamps. Delivers TWICE the amount of lumen output per foot of lamp length! For complete details, write for New Product Data Sheet No. 100 D.

Wheeler

REFLECTOR COMPANY

(Division of Franklin Research Corp.)

275 CONGRESS STREET

BOSTON 10, MASS.

Distributed Exclusively Through Electrical Wholesalers

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability



Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities— consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.



109

PRODUCTS DIVISION

The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4032 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

with the existing service conduit.

"Because people generally will buy and attempt to use many electrical appliances that did not exist ten years ago, we must write code rules to anticipate additional uses ten years hence and regard such rules as minimum standards. Electric light and power companies anticipate their generating capacity far ahead in ordering new equipment and tell us the load will double every ten years. That same generating equipment feeds the customer services we are here concerned with, and code rules should require 100-amp minimum services to tie into the system. A chain is no stronger than its weakest link."

Conductors

Q. *We have been asked to connect a new machine in a sash and door plant here that is operated by four motors. These motors are 3-phase, 208-volt, two are 5 hp, one is 10 and one is 1 hp but during the time the 10 hp motor is operating, the controls are such that the two 5 hp motors cannot operate. According to the manufacturer, the feeder to this machine may be three 6s. However, the total connected load amounts to some 67 amps and I am told I must use 4s. Is this correct?—K.R.*

A. No, it is not correct. While it is true that Section 4314 does state conductors supplying two or more motors shall have a current-carrying capacity of not less than 125% of the full-load current rating of the highest rated motor in the group plus the sum of the full-load current ratings of the remainder of the motors in the group, it is also true that under Section 4316 permission is granted to reduce the size of the feeder wherever a reduced heating of the conductors resulting from motors operating an duty-cycle, intermittently, or from all motors not operating at one time. The authority enforcing this code may grant permission for feeder conductors to be of a capacity less than specified in the sections 4314 and 4315, provided the conductor is of sufficient carrying capacity for the maximum load determined by the sizes and number of motors supplied and the character of their loads and duties.

Therefore, inasmuch as the controls in this machine are so arranged that the two 5 hp motors

MORE LIGHT for the MONEY with the NEW POWER-GROOVE INDUSTRIALS by SMITHCRAFT

Up to 2½ times higher lighting levels can be obtained with a given number of fixtures *at a lower initial cost per footcandle*. Smithcraft and Power-Groove are now combined to give employees a better, more productive see-level and to save employers *real money*.

Smithcraft Power-Groove Industrials are beautifully constructed industrial units that utilize the very high lumen output of the new Power-Groove lamps to provide real economic advantage along *with comfortable lighting*. These units, designed for top value and for very long-term use in today's factories, mean that you can save between 5 and 20% on your initial lighting investment. Ask your Man from Smithcraft.

POWER-GROOVE INDUSTRIALS *by Smithcraft are quickly and economically mounted, individually or in continuous rows, using any conventional method. Reflectors, ribbed for extra strength, are available in Smithcraft White Porcelain Enamel or in Smithcraft Bonderite and Baked White Enamel Finish. Louvers for 30° lengthwise shielding are optional.*

Smithcraft POWER-GROOVE and MONITOR Industrials feature:

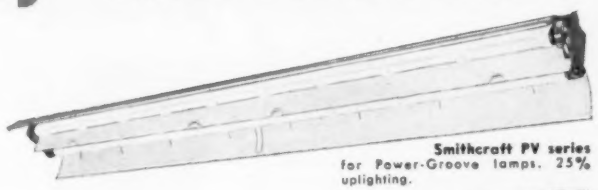
- Ribbed reflectors for extra strength.
- Scientifically-designed collared apertures.
- Reflector couplings are plastic inserts, sealing light leaks and lining up reflectors in continuous row mounting.
- New-type turret lampholders hold lamps securely in place.
- Slanted lampholder front reduces dark area between fixtures.
- Reflectors are quickly released by easy-to-grasp captive catches.



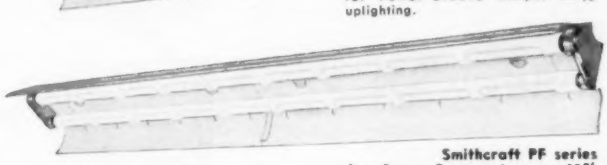
THE MAN FROM SMITHCRAFT

Paul Wehner, Dayton, Ohio representative. Like every member of Smithcraft's nationwide sales organization, his ability to talk your language can mean a lot to your profit picture.

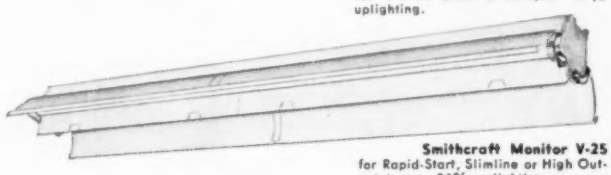
Smithcraft "AMERICA'S FINEST FLUORESCENT LIGHTING"



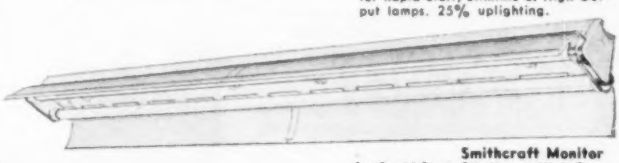
Smithcraft PV series for Power-Groove lamps. 25% uplighting.



Smithcraft PF series for Power-Groove lamps. 15% uplighting.



Smithcraft Monitor V-25 for Rapid-Start, Slimline or High Output lamps. 25% uplighting.



Smithcraft Monitor for Rapid-Start, Slimline or High Output lamps. 15% uplighting.

Smithcraft LIGHTING, CHELSEA 50, MASS.

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Smithcraft LIGHTING, CHELSEA 50, MASS.

NAME_____

TITLE_____ CO._____

ADDRESS_____ CITY_____ STATE_____

☐ Please send me the monthly publication, "Light Side of the News", so that I can keep in touch with the latest trends in lighting.

☐ Please send me catalog information on the NEW SMITHCRAFT POWER-GROOVE and MONITOR INDUSTRIALS.

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Put wiring anywhere Safely with

NATIONAL ELECTRIC PRODUCTS NE WIRING SYSTEMS WIRES AND CABLES

SURFACE RACEWAYS

National Electric Surface Raceways make possible safe, fast, economical on-the-surface wiring for commercial, industrial, institutional or residential installations.

METAL MOLDING

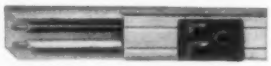
Carries up to 10 conductors. Bends around offsets and columns. Install by simply attaching base, laying in wires and snapping in capping. No fishing necessary.





PLUG-IN STRIP

This prewired raceway is furnished with a spread of outlets every six or 18 inches and a choice of electric services . . . constant, grounded equipment or both constant service and automatic switch control.





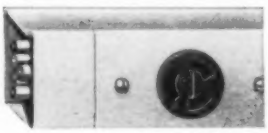
BASEDUCT

A new easy-to-mount wiring system at the baseboard level. Duplex receptacles provided every 30 or 60 inches in an easily installed wiring harness. Three inches high, baseduct extends ¾″ from wall, contains raceway to handle branch circuit requirements.



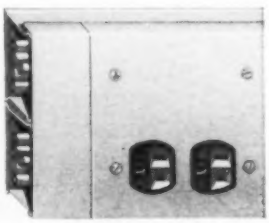
SURFACEDUCT

A two-piece, all-purpose lay-in raceway for every type of service up to 60 amperes. Device covers accommodate over 300 standard devices—simple fittings for all job requirements.



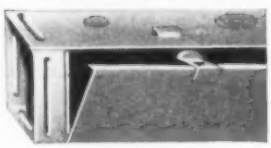
TWINDUCT

A large capacity combination high and low potential electrical raceway for commercial and light industrial applications. Consists of two rows of Surfaceduct with common cover.



WIREWA

Hinged-lid wireway with 4″ x 4″ cross section provides steel protection plus accessibility. Concentric KO's. Available in 6″ x 6″ cross section. Easy to re-route or extend.



Listed by Underwriters' Laboratories Inc.

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

cannot be operated while the 10 hp motor is energized, a maximum load would exist during the time the 10 hp and 1 hp were in operation, and 6s would be sufficiently large to act as feeders for this unit.—G.R.

Lighting For Showcases

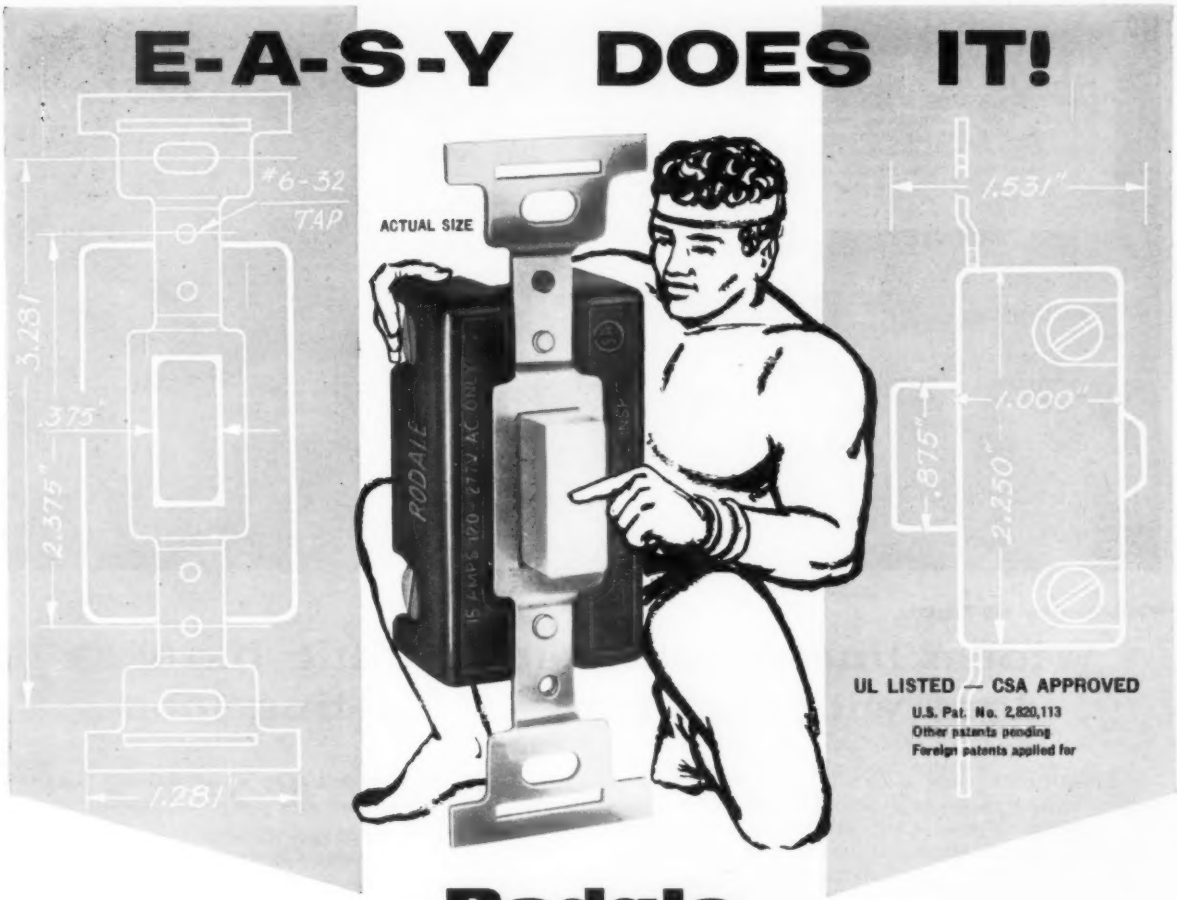
Q. *I have been asked to submit a bid on the cost of installing tubular lighting in some showcases being locally constructed. Inasmuch as these cases are constructed of wood and glass, will it be possible to mount the ballasts underneath the showcases if they are mounted on a sheet of 14 gauge or heavier metal suspended from the wood bottom of the showcase? There are approximately 8 in. between the wood bottom of the showcase and the floor line.—F.C.*

A. No, it would not be possible to so mount these ballasts as Section 4185 of the Code will require that they be completely enclosed in permanently installed metal cabinets which are accessible. In addition, Section 4184 would require that these cabinets be mounted at least 1½ inches below the surface of the bottom boards of the showcase. Some provision, of course, must be made for ventilation of this area between the floor and the bottom of the showcase.—G.R.



BENN J. HARTMAN, vice president of Flood-Lite Service, Inc., is one of the few million-mile travellers in this country. Much of this travel is in connection with the supervision of his company's seven offices located in Southern California, Chicago and Houston. Here the camera catches him during one of his typical detail-crowded days at his Los Angeles headquarters.

E-A-S-Y DOES IT!



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U.S. Pat. No. 2,820,113
Other patents pending
Foreign patents applied for

Rodale

Sets The Pace With The



E-A-S-Y ACTION... E-A-S-Y TO INSTALL

"B" *Touchette*®

No knob to turn. No toggle to flip. Now, there's a switch designed for today's *push-button living*. It's "B" Touchette, the touch switch with feather-light operation. Not only that . . . but when you specify Touchette for new construction or remodeling jobs, you have easy installation, as well. Touchette measures just *one inch* in depth . . . allows for quick, simple installation . . . even in boxes where several wires enter.

Touchette needs no special wiring . . . fits standard outlet boxes and toggle wall plates and operates on full line voltage. Rated 15A—120—277V, it withstands motor loads up to 80% of rated capacity.

All these features . . . and "B" Touchette is the least expensive touch switch on the market!

Available in single pole, double pole, 3-way and 4-way models. Brown or ivory touch button.

Sold only through electrical wholesalers.
Or for further information and prices, write: CM-3

Rodale manufacturing co., inc. emmaus, pa.



Revere's No. 5440 mercury Ultra-Lites and hinged poles installed at Warson Village shopping center, Glendale, Missouri. Uniform, square light patterns produced by Ultra-Lites eliminate "dark spots"; wide coverage reduces pole requirements 50% to 75%.

The facts of light:

Widest line of matched lighting fixtures does widest variety of lighting jobs

From parking lots to race tracks . . . from street lighting to such varied applications as underwater lighting for swimming pools or airport marking and approach lighting — Revere offers you the industry's widest line of *matched* outdoor lighting fixtures.

One responsible source provides the equipment you need — matched to "fit" together for easiest installation. On-time deliveries of components are carefully scheduled to meet your job requirements.

Whether your project calls for incandescent, mercury or fluorescent lighting, check with your electrical wholesaler on the many advantages of Revere equipped installations. Revere's *only* business is outdoor lighting.

Write for catalog covering Revere's complete line



Revere ELECTRIC MFG. CO.

Revere Electric Mfg. Co., 6009 Broadway, Chicago 40, Ill., UPtown 8-7100

Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

OUTDOOR LIGHTING: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers



Chicago area race track is illuminated with Revere "2000" series long range floodlights mounted on grandstand roof, and No. 3803 Elip-tor Floodlights mounted on Revere Hinged Poles No. 199-D-30. Light intensity at finish line is built up by aiming floodlights toward that area.

Minn. Contractors Hold Record Convention

More than 450 Minnesota electrical contractors and their guests pushed registration past the 1800 mark at the 21st Annual Upper Midwest Electrical Industry Convention held February 2-5 at the Hotel Leamington in Minneapolis. Running concurrently with the convention was the 9th Biennial Electrical Trade Exposition at the Municipal Auditorium a few blocks away. This 150-booth educational display of 173 electrical manufacturers' products drew a carefully screened attendance of some 3000 persons.

This unique convention, coordinated through the North Central Electrical League, Minneapolis, annually brings together under one roof representatives of electrical contractors, commercial utilities, municipal utilities, electric cooperatives, electrical inspectors, manufacturers and wholesalers. The three-day agenda provides separate meetings where each group can discuss its own problems, and joint sessions where topics of interest to all are explored.

For the Minnesota Electrical Association, Inc.—a group of some 225 out-state electrical contractors and contractor-dealers—this was the 30th Annual Meeting. General consensus among those present was that the much publicized recession had not, as yet, reached many of the areas represented at the meeting. Manpower shortage was still a problem with many contractors. Continued bid-shopping on the part of general contractors was apparent from various discussions of "problems".

Partial relief from the skilled manpower shortage problem is in the offing. The Minnesota State Department of Education is offering a home-study correspondence course for electrical apprentices. This is designed specifically for the isolated trainee who cannot secure related training in an area vocational school. As outlined by Harold Donkersgoed, State Itinerant Instructor of the Dept. of Education, this four-year course includes one lesson per week and covers such subjects as basic electricity, blueprint reading, practical mathematics for electricians, codes, etc. While present plans restrict this to apprentices, there is a possibility that later it may be extended to journeymen and master electricians.

Legal problems comprise another facet of small business operation and the electrical contractor is no exception. Virgil H. Hill, representing the association law firm, cautioned contractors to remember their mechanic's lien rights and to file conditional sales contracts with proper authorities since this is the only security they have with respect to such transactions. Decision to do so must be tempered with good business and public relations sense, he added.

The Minnesota State Board of Electricity is making a concerted effort to obtain uniform interpretation of the electrical codes on the part of its inspectors. School for inspectors are already underway in independent educational institutions and some 40 inspectors are enrolled, reported S. M. Sanford, executive secretary of the State Board of Electricity. Sanford advised contractors to pay inspection fees to the State Board who will, in turn, reimburse the area inspectors. In the past, individual inspectors collected the fees.

MEA members were especially interested in a report of Elroy Lehn, Anoka, chairman of a committee appointed to revise the association estimating manual. A new loose-leaf, indexed estimating and accounting manual is about ready for printing and should be available to members in the very near future, Lehn advised. The association also plans to issue supplements to the manual as conditions warrant, he noted.



MINNESOTA ELECTRICAL Association officers recently elected at the 30th Annual Meeting of the contractor group in Minneapolis include (L to R): secretary—S. J. Berquist, Litchfield; treasurer —Bert Gordon, Albert Lea; president—Milo Miller, Blue Earth; and vice president—Gene Burton, Brainerd, Minn.

You have to spend money to make money was the theme of a talk by Wm. A. Ritt, St. Peter, Minn. contractor, a founder and former president of the association. Relying on his own long experience in business and that of fellow contractors, he pointed up the advantages of using good business forms, good cost accounting, accurate records, estimating, and advertising. For a straight contracting operation (no appliance sales), an annual expenditure of



UPPER MIDWEST AWARD winners in the 1957 International Lighting Competition who received certificates at the Upper Midwest Electrical Industry Convention in Minneapolis included (L to R): contractor H. E. Fraser, Langford Electric Co., Minneapolis; consulting engineers J. M. Quealy accepting for Louis R. Lundgren, Hoarstick, Lundgren & Associates, St. Paul, and George Ellison, Eriksen, Ellison & Associates, Inc., Minneapolis; electrical wholesaler B. E. Weigel, W. A. Roosevelt Co., LaCrosse, Wis.; and consulting engineer L. W. Johnson, Thorshev & Carney, Minneapolis. W. T. Stuart (right), editor, Electrical Construction & Maintenance made the presentations.



CONTRACTOR Milo Miller, Service Electric Co., Blue Earth, Minn., takes over as 1958 president of the Minnesota Electrical Association. Miller took office at the 30th Annual Meeting of the MEA in Minneapolis.



POINTERS on selling services are given Minnesota electrical contractors by Glen M. Bronson, sales consultant, Minneapolis, at annual meeting of the Minnesota Electrical Association.



KNOW YOUR COSTS and don't undersell a quality electrical installation for the sake of price, J. H. Dalton, vice president, Henderson-Hazel Corp., Cleveland, Ohio, cautions contractors at the MEA annual meeting in Minneapolis.

one-half of one percent of gross volume for advertising is a nominal figure, he advised.

E. J. Gallagher, Federated Mutual Insurance Co., reviewed present trends in health and welfare insurance and outlined the advantages of group participation (through the MEA) for electrical contractors and their employees.

Open Forum

Various phases of an electrical contracting operation were investigated at an open forum session sponsored by the MEA and Twin Cities Chapters, NECA. The formal agenda covered salesmanship, profitable operation and new concepts of electrical system distribution.

J. H. Dalton, vice president, Henderson-Hazel Corp., Cleveland, Ohio, cautioned contractors about underselling a quality electrical installation by cutting down on material quality or eliminating customer electrical convenience merely for the sake of price. Customers want the best job they can get within a reasonable cost and are not always looking for the cheapest job, he noted.

On the subject of billing small jobs, he recommended a doctor's "for services rendered" type of invoice listing price and a description of work done. Reverting to an itemized list of materials and labor used can cause misunderstanding and confusion, he added. Dalton revealed that an increasingly large number of electrical contractors are now using the National Price Service "Red Book" for estimating material costs. This volume, originally issued for wholesalers, lists contractor costs instead of suggested resale prices as in the "Blue Book" normally used by contractors.

Salesmanship plays an important role in any business operation—contracting included. Make yourself and your business "distinctive" by the caliber of salesmen you employ, advised Glen M. Bronson, Minneapolis sales consultant. Have your salesmen know the fundamentals of the service they offer, be a friendly listener, thoughtful, grateful and loyal. People like to do business with people they like, is a good axiom to remember, he added. Make all your employees customer-conscious. Never underestimate your customer's intelligence, but never overestimate his knowledge of your business, Bronson cautioned, adding that you should strive to be a little bit better than your competitor.

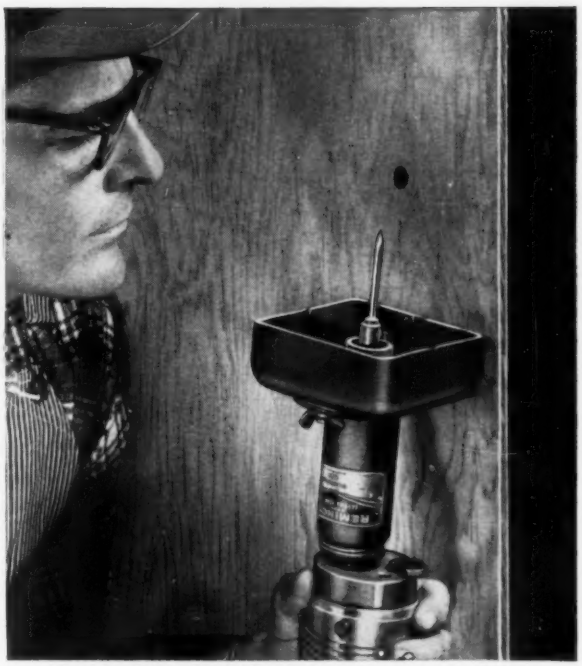
A tremendous market potential exists in the rewiring of industrial electrical distribution systems to bring capacity up to date and take care of future needs, stated E. T. Carlson, vice president and general manager, Electric Distribution Products Corp., Allentown, Pa. But, it is going to require industry teamwork to accomplish this, he added. While employing distribution techniques, he described his concept of a pre-engineered, unitized distribution system that "can be taken from distributors' shelves"



FIVE MASSACHUSETTS CONTRACTORS received plaques in recognition of their successful participation in the 1957 International Lighting Competition. These winners included William Black, Power Electrical Co., Wakefield; Richard S. Beckford, Beckford Brothers, Electricians, Haverhill; William J. Rudolph, Rudolph Electric Co., Chelsea (seated); John M. Blomgren, Eastern Electric Co., Cochituate, and Walter J. Bovay, Bovay Electric Co., Foxboro.



If operator inadvertently fires new Remington Captive Stud Tool into inadequate base material—



Captive Stud Guard Assembly prevents free flight of stud which is locked to tool during firing.

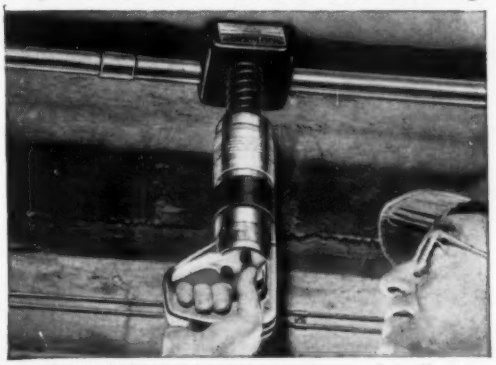
Safest Stud Driver Ever Designed!

Remington Stud Driver...with Model 440 Captive Stud Guard Assembly

Power, efficiency, speed *and safety* are features of the new Remington Stud Driver with Captive Stud Guard Assembly. It's designed to prevent free flight of studs through a working surface . . . permitting use of the tool in a whole new range of fastening situations.

Just squeeze the trigger to anchor wood or metal sections to concrete or steel with ¼" diameter Remington Studs. Scientifically graded 22 caliber Power Loads furnish *exact* driving force you need to do the work. No pre-drilling, no outside connections required!

What's more, you can choose from a *complete* selection of ¼" diameter Remington "Power-Guide" Studs. And for particular applications involving repetitive use, you may prefer one of 15 special-purpose guards to adapt the versatile Stud Driver to *your* job requirement!



JUST SQUEEZE TRIGGER to anchor conduit clips to concrete walls and ceilings with this *new* Stud Driver! You can take the tool anywhere, use it anywhere for all your light, medium and heavy-duty fastening jobs.

Exclusive Remington Captive Stud Guard Assembly has new "Safety-Zone"





Heart of the Captive Stud Assembly is combination of square-headed piston and aluminum alloy buffer. Piston is abruptly halted by buffer when base material is inadequate to stop the stud. Remember: If it's the Remington Captive Stud tool, it's the safest Stud Driver on the market!

Remington DUPONT

STUD DRIVER

Remington Arms Company, Inc., Bridgeport 2, Connecticut

Mail coupon for free booklets



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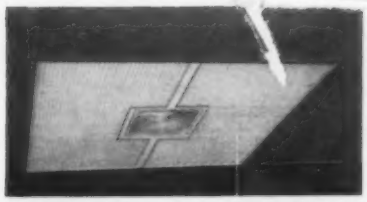
Please send information about the new Remington Stud Driver and Model 440 Captive Stud Guard Assembly.

Name.....

Firm.....*Position*.....

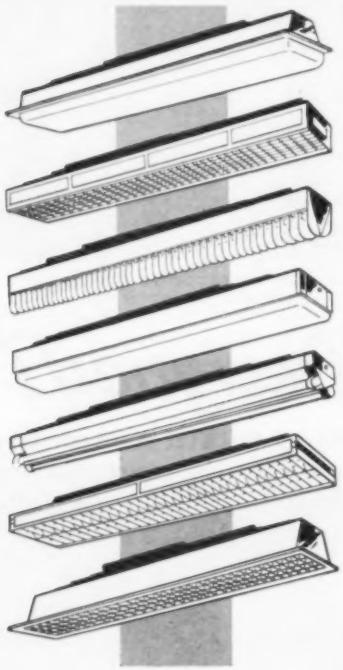
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City.....*State*.....



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STARTER TYPE—RAPID START
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- Pioneers in Fluorescence since its inception.
- Modern functional designs.
- Stock fixtures adaptable for all lighting layouts.
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- Patented E-Z Servicer.
- Designed and manufactured by WILEY with ETL Certified Electrical Components.

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and whose components have been "shelf-engineered" into standard packages with unlimited applications as assemblies. Combine this "Uni-Bus" with "Isoline" switch components and you approach "total safety" in your distribution, he noted. Such switches are designed so no accessible parts are "live" when the cover is opened.

As to the future, Carlson predicted segmented distribution—parallel runs of smaller bus duct instead of one large bus duct; standardization of components doing like functions; more radial and loop-type systems segmented for greater efficiency; low-reactance plug-in type ducts; more use of aluminum; new levels of safety.

Codes Session

As usual, the evening All Industry Wiring Codes Meeting drew a capacity audience. Contractors, inspectors, plant men, journeymen and others were present. Panel included: O. K. Coleman, Lafayette, Ind.; S. Martin Streed, chief electrical inspector, City of Minneapolis; George A. Yineman, North Dakota State Board of Electricity, Bismark, N. D.; Rome Rutherford, State Industrial Commission, St. Paul, Minn.; S. M. Sanford, executive secretary, Minnesota State Board of Electricity, St. Paul; and Stan Sayre, electrical inspector, St. Paul. Ed Turner, president, Minnesota Chapter, IAEI, acted as moderator.

Lighting Awards

The Lighting Progress Report, sponsored by the Twin City Section, IES, and presented by J. H. McCulloch, Independent Testing Laboratories, Boulder, Colo., was a session that attracted contractors, lighting engineers, architects and consulting engineers. At the conclusion of the report, W. T. Stuart, editor, *Electrical Construction & Maintenance*, presented Award Certificates to Upper Midwest winners in the 1957 International Lighting Competition (EC&M, December, 1957 issue).

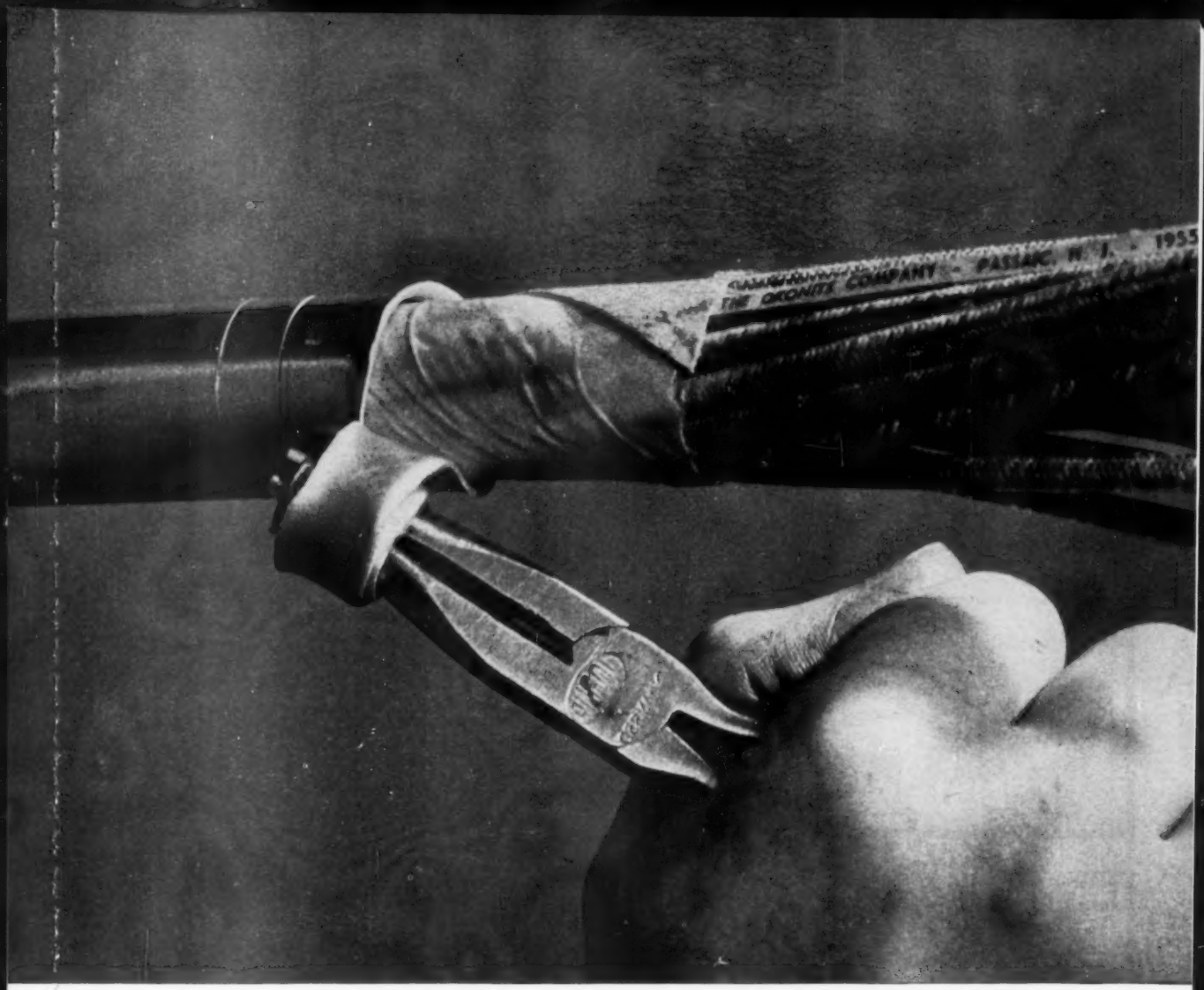
Those receiving certificates were: First Prize—Office Lighting—contractor H. E. Fraser, Langford Electric Co., Minneapolis and consulting engineer L. W. Johnson, Thorshev & Carny, Minneapolis; 2nd Prize—Office Lighting—electrical wholesaler B. E. Weigel, W. A. Roosevelt Co., LaCrosse,



NEW CONCEPT of "total safety" electrical distribution using pre-engineered, unitized components is presented to Minnesota electrical contractors at annual MEA meeting in Minneapolis by E. T. Carlson, vice president and general manager, Electric Distribution Products, Inc., Allentown, Pa.



ELECTRICAL LEAGUE of Cleveland will be led through 1958 by recently elected officers (in usual order) Phillip B. Leff, treasurer, pres. of the H. Leff Electric Co.; Randall J. Miller, first vice president, sales promotion manager for the Cleveland Illuminating Co.; Elmer S. Rehagen, president, district manager, Westinghouse Electric Corp.; and Stanley E. Strunk, secretary-manager of the League. Also elected (although not present for this photo) was George S. Trotter, second vice president, mgr., Buckeye Sales District, Large Lamp Dept., General Electric Co.



ALUMINUM-SHEATHED CABLES

...light ...strong ...smaller diameter ...easy to install and terminate

A seamless aluminum sheath over Okonite cables provides a durable, conduit-type covering of high tensile strength. Yet this aluminum sheath is easily worked with standard conduit tools. It can be bent around obstructions . . . terminated at boxes, transformers, and the like . . . trained in trays . . . or supported by conventional brackets and cable clamps. Standard fittings are available. This low-cost alternate to rigid conduit is available with virtually any Okonite insulation such as rubber, plastic or varnished cambric.

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Costs less than regular conduit installations.

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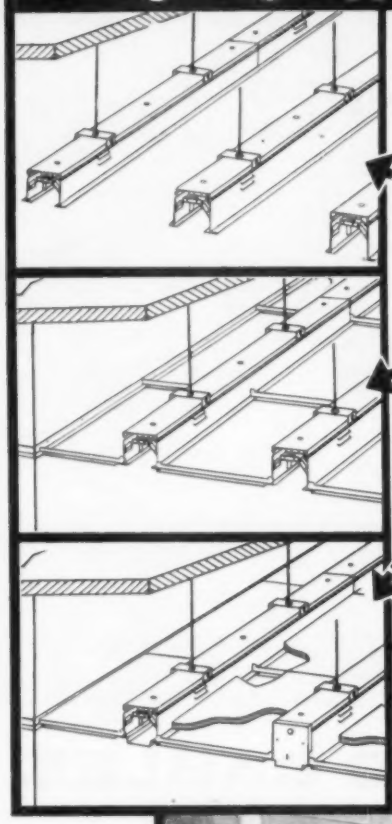


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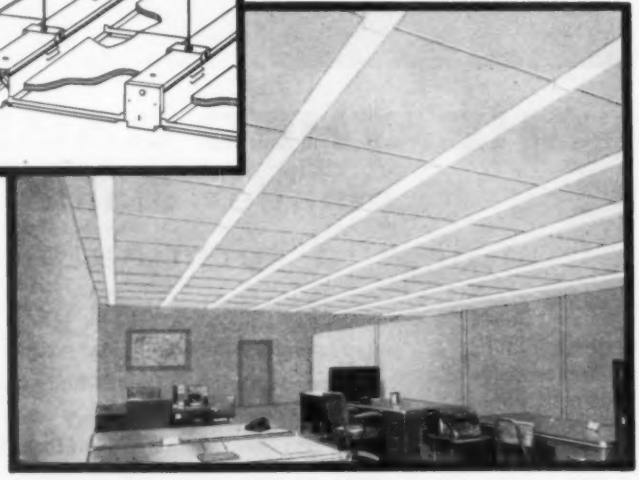
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3. Lay in acoustical panels on flanges of troffers, spacer bars and wall angles. Insert extruded polystyrene plastic diffusers in troffers.



RESULT: Evenly diffused wall-to-wall quality lighting with efficient acoustics at lower cost . . . for offices, schools, libraries, drafting rooms, corridors, homes. Write for catalog and specification sheet today!

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CODE EXPERTS answering questions at All-Industry Wiring Codes session at recent Upper Midwest Electrical Industry Convention in Minneapolis include (L to R): O. K. Coleman, Lafayette, Ind.; S. Martin Streed, chief electrical inspector, City of Minneapolis; G. A. Yineman, chief electrical inspector, North Dakota State Board of Electricity, Bismarck, N. D.; Rome Rutherford, director of inspections, Minn. State Industrial Commission, St. Paul; S. M. Sanford, executive secretary, Minn. State Board of Electricity, St. Paul; and Stan Sayre, electrical inspector, St. Paul, Minn.

Wis.; 3rd Prize—Office Lighting—architect Bertil Fasth, Fasth, Hillstrom & Horty, Minneapolis, and consulting engineer George Ellison, Eriksen, Ellison & Associates, Minneapolis; 3rd Prize — Institutional Lighting—consulting engineer E. J. Polasek, Eau Claire, Wis.; honorable mention — Institutional Lighting — consulting engineer Louis R. Lundgren, Haarstick, Lundgren & Associates, St. Paul, Minn.

MEA Officers

At the Minnesota Electrical Association, Inc. business session the following officers were elected: president—Milo Miller, Blue Earth; vice president — Gene Burton, Brainerd; secretary—S. J. Berquist, Litchfield; treasurer—Bert Gordon, Albert Lea. Harry W. Kane, Minneapolis, is MEA manager.

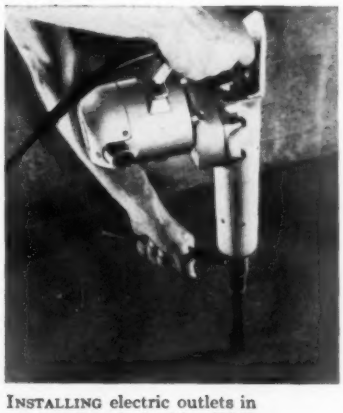
Representing the various districts on the MEA Board of Directors are the following contractors: (Dist. 1) L. P. Kemp, Winona, and Oliver Larson, Faribault; (Dist. 2) Louis Kasperak, LeSueur, and Robert DeWar, Fairmount; (Dist. 3) N. G. Miller, Benson, and Bill Hayworth, Worthington; (Dist. 4) V. J. Dalager, Morris, and Julius Holt, Almora; (Dist. 5) C. P. Meyer, Melrose, and Al Singer, St. Cloud; (Dist. 6) A. A. Koziol, Watertown, and Earl Odmark, Cambridge; (Dist. 7) Paul Kuzel, Pine City, and LeRoy Hauer, Little Falls; (Dist. 8) M. Zimmerman, Hibbing, and R. C. Edman, Hibbing; (Dist.



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BREAKING holes through concrete or brick; demolition work goes easier with bull point tool.



INSTALLING electric outlets in concrete is a cinch with a B&D Hammer.

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You can have your load center transformers designed to your requirements; to match new switchgear, existing switchgear or with switchgear of your choice; and within almost any dimensional limitations at no greater cost than you'd pay for an off-the-shelf unit. Standard Transformer builds them. Prove it to your own satisfaction today. Call your nearby Standard representative or write directly to us. If it's a rush job call us direct.

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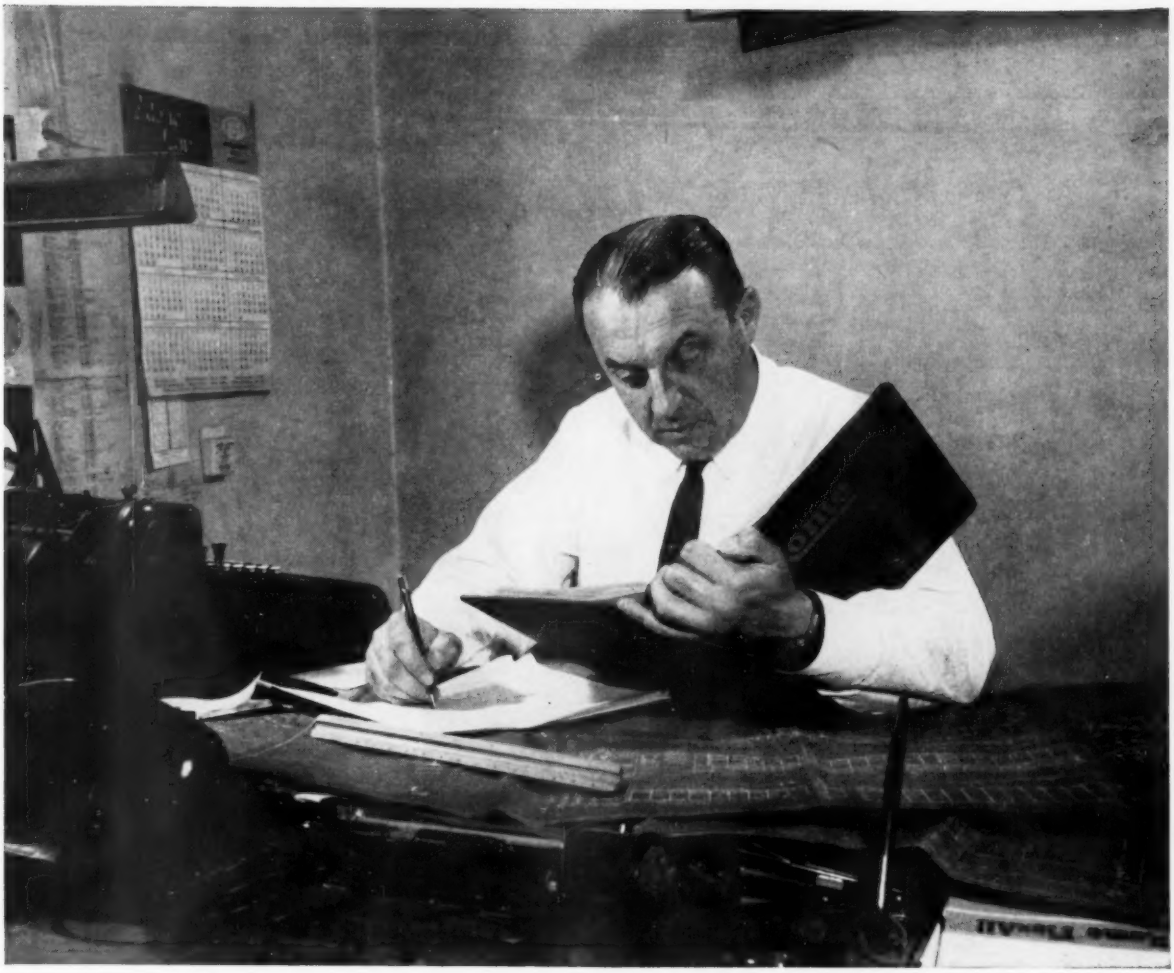
A REVISED easy-to-use estimating and accounting manual for electrical contractors is being published by the Minnesota Electrical Association, Elroy Lehn, Anoka, Minn., contractor tells the group at its 30th Annual Meeting in Minneapolis. Mr. Lehn is chairman of the manual revision committee.

9) L. W. Best, Thief River Falls, and Joseph Lee, Mahnomen.

Other general sessions interested contractor registrants. At the all-industry luncheon, Edwin Vennard, managing-director, EEI, predicted an upsurge in installed generating capacity to meet (and exceed by a 20% reserve margin) the anticipated increased use of electricity. At the rural electric development session, Leonard Vainik, Vainik Electric Co., Virginia, Minn., recounted the outstanding acceptance of electric house heating even in 11,000 degree-day areas.



PROUD POSSESSORS of International Lighting Competition Award Certificates are (L to R): electrical wholesaler B. E. Weigel, W. A. Roosevelt Co., LaCrosse, Wis.; consulting engineer J. M. Quealy accepting for Louis R. Lundgren, Haarstick, Lundgren & Associates, St. Paul, Minn.; and George Ellison of Eriksen, Ellison & Associates, Inc., consulting engineers of Minneapolis. Awards were presented at recent Upper Midwest Electrical Convention by W. T. Stuart, editor, Electrical Construction & Maintenance.

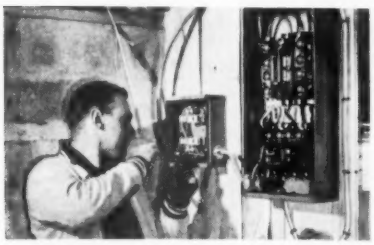


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Submit lower bids on 100-amp service jobs

To meet today's highly competitive conditions, you can trim as much as 15% from your bids for 100-amp service jobs —where voltage drop is no problem.

Using Rome's SE Style U service entrance cable, you can substitute No. 3 AWG copper conductors for the more expensive No. 2 AWG. This money-saving substitution is possible because Rome's SE cable has UL approval for 75 C operation in either wet or dry locations. A reinforced rubber moisture seal under the weather-resistant braid gives Rome's SE cable its own built-in "dry location."



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Neat appearance The neutral-gray weatherproof finish will readily blend with the outside color schemes of most houses, and can easily be painted when necessary.

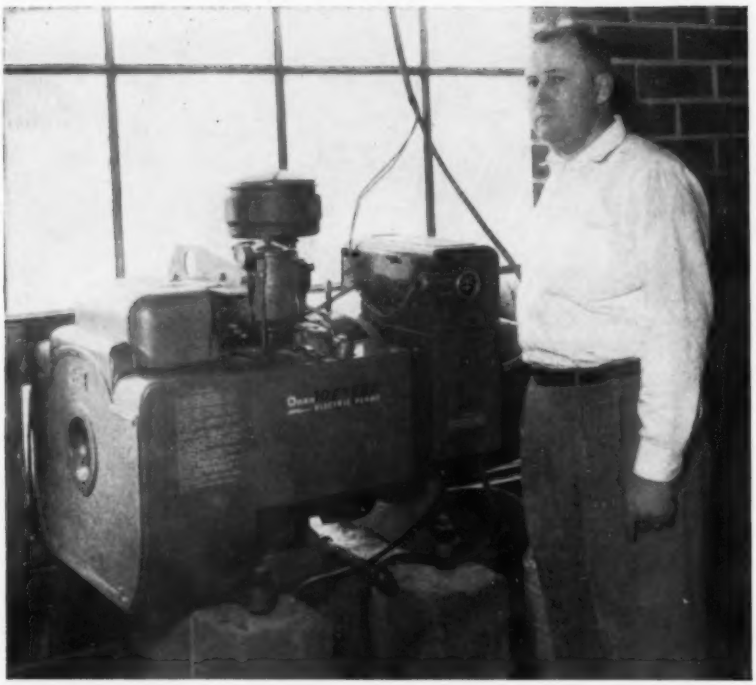
Easy identification You'll save wiring time because the combination cotton-glass braid on each conductor is colored for easy and quick identification—one black and one red.

Let Rome's SE Style U service entrance cable help you bid lower on your next job. For more information, contact your nearest Rome Cable distributor—or write to Department 369, Rome Cable Corporation, Rome, N. Y.

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Standby plant paid for itself four times in four months

"Couldn't operate without this protection", says C. G. Young of the Hiawassee Hatchery

Sleet, lightning, wind and snow . . . each took their turn at knocking out the high-line serving the Hiawassee (Georgia) Hatchery. Power was off for periods ranging from 2 to 7 hours. Each time, the Onan CW Standby Plant started automatically and took over the power load . . . operating all essential equipment *and preventing any loss whatsoever.*

Standby protection at lower cost

Onan air-cooled plants like the CW model shown here, cost substantially less than water-cooled units of similar capacity. Onan's exclusive Vacu-Flo cooling system permits using these lower-cost, air-cooled units where previously it would have been necessary to use water-cooled plants or to install elaborate ventilation equipment. Vacu-Flo models range from 1,000 to 10,000 watts . . . water-cooled from 10,000 to 75,000.



Automatic operation . . . *This Onan line transfer control starts the electric plant when power is interrupted and switches current to all essential hatchery equipment. Plant stops automatically when power is restored . . . protects hatching stock at all times.*

Models for homes, farms, industry. Write for information on dealerships.

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MAKING A POINT, Harry W. Kane, (right), manager, Minnesota Electrical Association, gestures emphatically as electrical contractors Earl Sorg (left) of Hastings, Minn., and E. H. Beal of Pipestone, Minn., listen attentively at MEA meeting in Minneapolis.

Illinois Chapter, IAEI, Meets In Chicago

At the winter meeting of the Illinois Chapter, IAEI, held at the Hotel Sherman, Chicago, Ill., January 30 and 31, Walter C. Lambert, Supervisor of Sales Promotion for the Commonwealth Edison Co., said that his company's nuclear-powered generating station at Dresden, Ill., will be ready for its initial test run during the summer of 1960. Lambert showed the 140 members and guests in attendance, by means of a sound film, the construction of the plant as it is progressing to date.

Chicago's Electric Association managing director, C. C. Simpson, stated in his report on National Electrical Week, beginning Feb. 9th, that Chicagoland's program to promote NEW is by far exceeding the efforts of all previous years.

Martin Smith, Bussmann Manufacturing Co., presented an informative technical slide lecture on the advantages of Current Limiting and High Interrupting Capacity Fuses. He stressed the need for these types of fuses especially in industrial and heavy commercial areas where fault currents may vary a great deal.

As usual, Code discussion and Code problems provided interesting debate at each day's session. Some of the topics that brought spirited discussion from the floor were:

(1) Grounding type receptacles and attachment caps for all portable appliances. In response to this, Guy Manning, Underwriter's Laboratories, who was one of the members of the all-industry panel, indicated that 3-wire cords and attachment caps will be on all washing machines manufactured after the first of



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For Timed Selling to the Construction Industry

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They're thrifty! M&W Kits contain every needed fitting for a quick, reliable wiring job. No lost time, no costly inventory. *They're fast!* Modern, time-saving slip-fittings are used throughout. With no thread-cutting, you reduce installation time to fractions. Complete range of sizes and fittings available to meet all local codes and conditions.

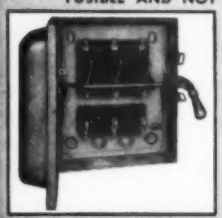
***NEW CATALOG 57** gives full details, prices, installation data on Mast Kits, Electrical Fittings, Cable Racks, Wiring Specialties. Write for your copy today.*



Complete-package Kits are furnished to your order and including fittings shown above.

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The M. & W. ELECTRIC MFG. CO., Inc.
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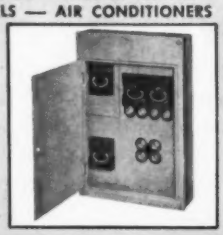
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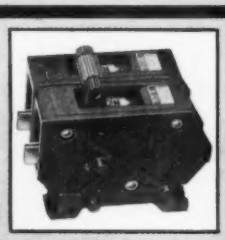
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15 to 50 Amps.
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CIRCUIT BREAKERS
40 to 210 Amp. Enclosures
INDOOR & OUTDOOR

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COVINGTON, KENTUCKY



NEW CHAIRMAN of the Illinois Chapter, IAEI, is Cal Condon, electrical inspector from Flossmoor, Ill. He is shown here (right) receiving gavel from retiring chairman James P. Corcoran (left) at the 28th annual meeting of the inspector group in Chicago.

January 1959, and that these machines will be available to the public around the first of July 1959.

(2) Accessible nameplates on appliances, such as electric ranges, dryers, air conditioners, etc. This last point led to the adoption of a conference resolution which stated "the phrase *readily accessible* be inserted in Sec. 4261 of the Code regarding nameplates.

A motion from the floor was also presented and adopted to form a committee to "study what is being done and what has been done to urge legislation to require state licensing of electricians, so that the Illinois Chapter can lend their support to the movement." The committee which will be chosen within the next 30 days will make a report of their findings at the midsummer meeting.

At the close of the business ses-

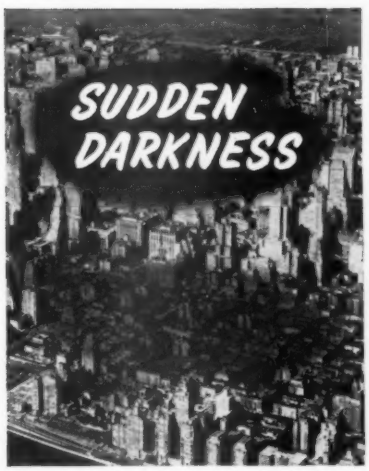


CO-OP INSPECTORS talking over one of the sessions of the Illinois Chapter meeting of IAEI are; (left to right) Randall Beasley, Coles-Moultrie Electric Co-op, Mattoon, Ill., Terry Clapp, Edgar Electric Co-op, Paris, Ill., and Joe Crosno, Cornbelt Electric Co-op, Bloomington, Illinois.

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Big market . . . easy to sell. Sudden darkness threatens thousands of businesses that still don't have Exide Lightguard.

Exide Lightguard® proved ultimate weapon against sudden darkness. Thousands of victims still unprotected.

Look around your own area. You will see lots of business places, institutions, factories, theaters that still need the protection of Exide Lightguard emergency lighting units. Right now they're in real danger of heavy losses from sudden darkness. But you can help them. Tell them about Exide Lightguard. Most sales are for several units—important dollar volume and good profit for you. If you're not a dealer yet, send the coupon today.

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Heavy duty Intermatics assure maximum reliability on the toughest jobs. Easy to install—easy to set—they save time, money, and trouble! It all adds up to the biggest PLUS in time switches today. Are you making the most of it? Write for the new 8-page color catalog Bulletin 38-Bt, illustrating and describing *63 Time Switch models!*



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OLD FRIENDS of neighboring cities who attended Illinois Chapter meeting of IAEI in Chicago are; (left) Harry C. Frieden, Chief Electrical Inspector, Moline, Ill., and (right) Jack Mahar, Chief Electrical Inspector, Rock Island, Ill.

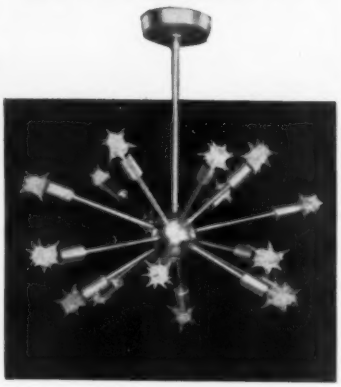
sion Cal Condon, Electrical Inspector, Flossmoor, Ill., was elected chairman of the Illinois Chapter. Don E. Coutts, Chicago, is first vice-chairman; Lyle E. Dunham, Springfield, Ill., second vice-chairman; and W. P. Hogan, Chicago, third vice-chairman. Clarence Wingfield, Chicago, was reelected secretary-treasurer. Members of the new executive committee are: L. J. Hall, Chicago, chairman; Henry Czech, Chicago, (wholesalers); Henry Kropp, Chicago, (contractors); Al Sommer, Chicago (manufacturers); Joseph Turek, Berwyn, Ill., (suburban); and J. P. Corcoran, Chicago, (past chairman).



FIRST PRIZE honors in the electrical contractor, office lighting division of the International Lighting Competition were shared by contractor H. E. Fraser, (left) Langford Electric Co., and consulting engineer L. W. Johnson, Thorshev & Carney, both of Minneapolis. Both received their awards from W. T. Stuart, editor, Electrical Construction & Maintenance, at the Upper Midwest Electrical Convention in Minneapolis.

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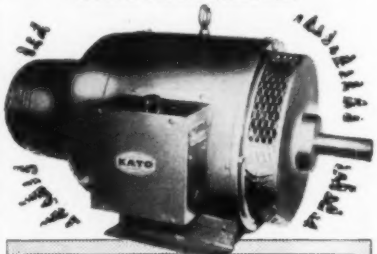
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ELECTRICAL INSPECTORS elected to head the Minnesota Chapter, IAEI, include (L to R): first vice president—Francis Fritz, Detroit Lakes, Minn.; president—Ed Turner, Minneapolis; secretary-treasurer—Stan Sayre, St. Paul. Niles Knutson of St. Cloud (not in photo) is second vice president of the Chapter.

Chicago Contractors Re-Elect Leasure

For the tenth consecutive year, E. E. Leasure, Jr., Monroe Electric Company, Chicago, was unanimously re-elected president of The Electrical Contractors Association of City of Chicago (Chicago Chapter, NECA). Mr. Leasure is chairman of the Chapter's Executive Committee and continues as a member of the NECA Board of Governors.

Jack W. Collins, secretary-treasurer of the 55-year old Association was re-appointed as Chapter Manager.

In addition to chairman Leasure, the Executive Committee is comprised of the following members: O. F. Burnett, Jr., Kelso-Burnett Electric Co.; J. N. Pierce, Pierce Electric Co.; L. W. Johnson, Johnson Electric Co.; W. W. Giesen, W. W. Giesen Electric Co.; C. P. Walters, Jr., Fries-Walters Company; W. J. Howe, J. Livingston & Company; T. L. Hankins, Condo Electric Co.; Fred Stocek, Hoffman Electric Co.; E. R. Hansen, Meade Electric Co., Inc.; C. A. Gall, Henry Newgard & Company; and W. J. O'Brien, W. J. O'Brien Electric Company, Inc.

NISA News

Registrations and reservations are pouring into NISA national headquarters in St. Louis for the 25th Jubilee Celebration, to be held in New Orleans at the Hotel Roosevelt on May 11-14.

New *FLITE*·CHEK tool

STOPS

fastener in its jaws!

PLYWOOD DEMONSTRATION

ONLY IN EMERGENCIES DOES THIS HAPPEN— — —

Unexpected soft spots in construction material hold no hazard for FLITE-CHEK. This new RAMSET® tool stops the fastener before it leaves the tool—prevents accidental escape!

Load and fire fast: no screwing or unscrewing of stud or piston either before or after firing—a double saving in time! Interceptor jaws work automatically. No delay or inconvenience.

Do an 8-hour job in 32 minutes with RAMSET FASTENING SYSTEM—the *engineered* method of fastening to steel and concrete. A squeeze of the trigger does tedious jobs instantly!

Now RAMSET, traditionally the safest powder-actuated fastening tool made, **is again first with the best**... safer than ever for work in concrete and steel.

Call your dealer for a FLITE-CHEK demonstration today. He's listed under "Tools" in the yellow pages. See the complete RAMSET-SHURE-SET® line of fastening tools.

INTERCEPTOR JAWS (Cutaway)



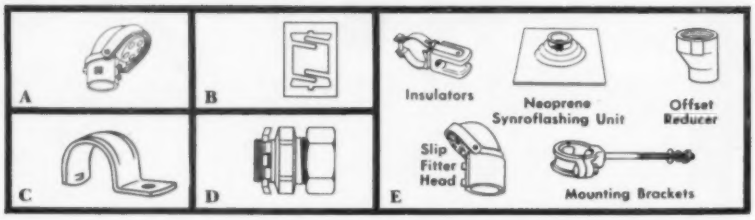
Ramset Fastening System

WINCHESTER-WESTERN DIVISION

OLIN MATHIESON CHEMICAL CORPORATION

12105-C Berea Road • Cleveland 11, Ohio

BLACKHAWK *your one best source for conduit fittings*



A SLIP FITTER HEAD made of ductile aluminum. No rusting or discoloration. Simply slip over conduit and tighten two set screws. Available in 2" and 2½" units.

B 540 BOX SUPPORT one piece box support. Provides rigid, unified support. Tabs are bent to inside of box, holding it tight. Broad, single support surface won't wobble or cut.

C SNAP STRAP snaps tighter. Has exclusive "hold bump." Ribbed bracket adds to the snap, provides rigid contact support of the conduit or EMT. Wide range of sizes. Quickly installed.

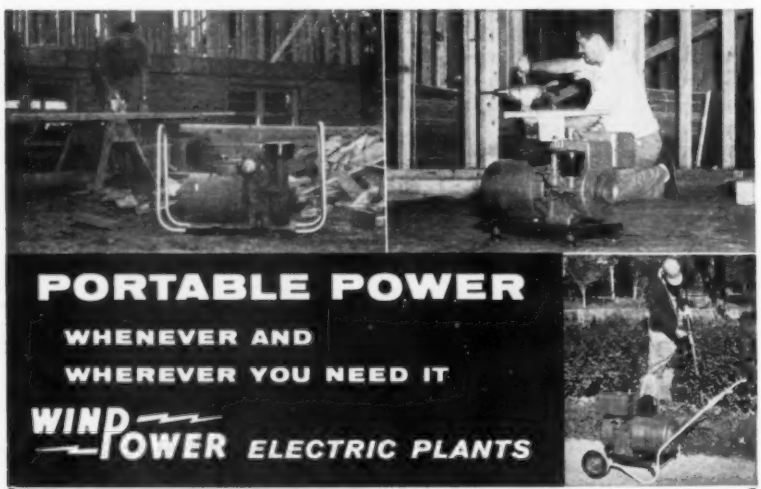
D EMT CONNECTOR has full, true, perfect threads for ease and speed of installation. Rain-tight. Finished in zinc to eliminate corrosion. Complete range of sizes.

E SERVICE ENTRANCE MAST ASSEMBLY consists of Slip Fitter Head, Synroflashing unit, Offset Reducer, Mounting Brackets and Insulators. The mounting brackets attach to vertical studding, support entire service drop strain. This eliminates water leakage at penetration point and vibration strain to rafters and roof.

Blackhawk service entrance masts, with slip fitter head and new synroflashing can be purchased as a complete kit or as separate fittings.

Blackhawk Industries, Dubuque, Iowa

Where the new ideas come from





750 watt to 2250 KW



750 watt to 2250 KW
Other units from
400 watt to 100 KW

Wherever the job—whatever the need—you can count on WINPOWER electric plants to meet your requirements. Low cost, instant power on the job speeds up production by operating time and labor saving tools. More than thirty years of experience guarantees top performance and long life. Portable cradle units or two wheel dolly types. The complete new line—all voltages and phases—is priced to beat all competition.

For dependable power—it's WINPOWER. Write for free brochure and complete information. No cost. No obligation.

WINPOWER MFG. CO., Dept. G-33, NEWTON, IOWA



A HOME STUDY course for Minnesota electrical apprentices is now available to those unable to take related training in area vocational schools, Harold Donkersgoed, State Department of Education, St. Paul, Minn., tells contractors attending the annual meeting of the Minnesota Electrical Association in Minneapolis. Mr. Donkersgoed is a state Itinerant instructor for the Department. MEA president, O. H. Pederson of Moorhead, is at left.

Executive vice-president Joseph M. Harrington said advance sales of both exhibit spaces and registrations were higher than anticipated. He advised both members and suppliers to register early, particularly if they plan to stay in the convention hotel.

"Room space is limited and assignments are being made on a first-come, first-served basis," Mr. Harrington said. After the Roosevelt is filled, conventioners will be assigned to other downtown New Orleans hotels.

All exhibit space has been sold, the association having to turn down, regretfully, several manufacturers and suppliers to the growing independent electrical service shop industry.

Mr. Harrington also announced that the convention program is nearing completion and will be announced shortly. The three morning sessions are being planned on a "materials, methods and management" theme.

• • • •

"March Is Membership Month" is the theme of NISA's first organized national membership campaign to enlist all qualified nonmember shops in the association. Murphy Miller of Tennessee Electric Motor Service, Knoxville, Tenn., national membership chairman, has urged all of the organization's 36 local, state and regional chapters to get behind the drive. From national headquarters the association is mailing literature and letters to a selected list of prospective members. On the regional and local levels, directors and chapter officers are following with special meetings where non-members are guests.

The job of NISA national president is a traveling job. Al Elson Jr., the current association leader, has been busying himself with visits to many NISA chapters, attending their meetings, directors' conference and visiting shops along the way. On Feb. 14 he attended the Rochester, N. Y. meeting of Niagara Chapter. In March his schedule includes visits to:

. . . a Hartford, Conn. tri-chapter (New York, New England and Connecticut) meeting, March 7 and 8;

. . . the Electric Club of West Virginia's March 12 meeting;

. . . the March 14, 15 conference of Heart of America Chapter, in Kansas City;

. . . Quaker City Chapter's Philadelphia meeting on the 19th and New York's regular monthly program on the 20th;

. . . a Denver quarterly meeting of Rocky Mountain Chapter on March 21, 22; and

. . . in April he visits Indiana Chapter on the 4th and Northern California Chapter on the 14th.

Mr. Elson also visited NISA national headquarters on Feb. 20, 21, and on the latter day he attended a joint meeting in St. Louis of the St. Louis and King Coal Chapters.

• • • •

Ontario Chapter met on Jan. 18 at the King Edward Hotel in Toronto. Speaker Ray Brule of the 3-M Co. discussed "What's New in Insulation." NISA president Al Elson and executive vice-president Joseph M. Harrington also spoke.

• • • •

The electric motor service shops of the Pacific Northwest joined forces last month for the celebra-

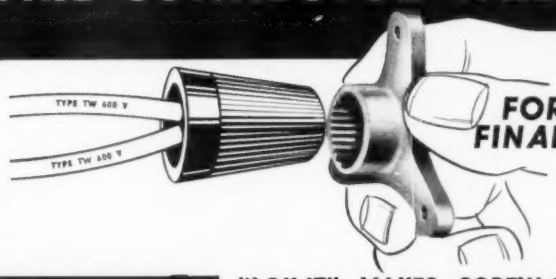


POST-SESSION huddle at plant maintenance conference in Chicago finds (L to R) T. W. Loper, electrical maintenance supervisor, National Research Council, Ottawa, Canada, discussing problems with W. J. Horton, electrical maintenance engineer, Burroughs Corp., Detroit, Mich.

THERE'S NOTHING LIKE IT!

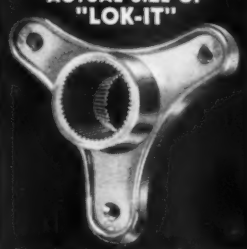
the NEW "Hi" "LOK-IT"

WIRE CONNECTOR WRENCH



FOR THAT FINAL TWIST!

ACTUAL SIZE OF "LOK-IT"



Here's the best pal a wire connector (electrician too) ever had! This is no toy or "gimmick"... It's a precision-molded tool! Fits easily in your pocket or pouch.

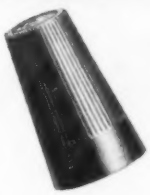
"LOK-IT" MAKES SCREW-ON WIRE CONNECTOR JOINTS SO TIGHT YOU CANNOT UNSCREW THEM WITH YOUR BARE HANDS!

All you do is slip "LOK-IT" over the knurled end of a "Hi" Bakelite Wire Connector and twist! "LOK-IT" does the work — saves your fingers . . . gives you a locking-grip on any wire combination . . . every job will pass the most critical inspection.

"LOK-IT" Wrench is an exclusive "Hi" product, specially designed to fit 2 sizes of "Hi" Screw-On Bakelite Wire Connectors — No. Hi-4 and Hi-6 ("standard" and "large" construction wiring sizes).

You can't buy "LOK-IT" . . . See your distributor for FREE "LOK-IT" . . . one packed in every No. Hi-46 carton . . . or write to us for your FREE WRENCH!

"Hi" WIRE CONNECTORS



TWO SIZES (Hi-4 and Hi-6)

NOW U.L. APPROVED FOR 600 VOLT USE

(Comply with 1956 National Electrical Code)

AND THAT'S NOT ALL—also U.L. listed as pressure cable connectors for general use in all types of branch circuit wiring—conduit, armored cable, non-metallic sheath, open and fixture hanging . . . machine hook-up, appliance repair, etc.

MILLIONS IN USE!

OTHER "HI" QUALITY PRODUCTS
- Tape-Mate Winder
- Fish Tape Reels
- Plastic Screw Anchors & Kits
- Conduit "Snap-Straps"

AND MANY MORE!

MAIL TODAY FOR 1958 "HI" CATALOG

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☐ Send Sample Connectors & Free Wrench!

Hi TRADE MARK REG.

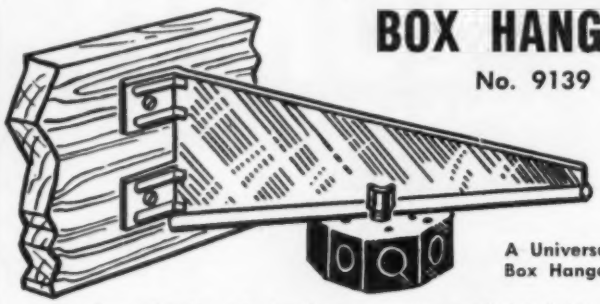
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There's An Easier Way!

Use KEES adjustable OUTLET BOX HANGERS

No. 9139



A Universal Box Hanger

Yes, Kees adjustable outlet box hangers are easier, and quicker, too! There's no need to notch the joist, for "offset" Kees hangers may be fastened to higher or lower side of joist. Box may be adjusted to any position from close to ten inches out from joist.

Can be used for mounting any type of box and fixture from any type ceiling using any wiring.

More easily installed than a bar hanger. Fastens to joist with 3 nails. Bracket is heavy pressed steel ten inches long. Three inches wide at nailing end. Rigid and amply strong. Lower edge is formed into tube on which the fixture-stud slides. Stud can be positioned exactly. Comes complete with fixture-stud and over-size notched locknut. (Outlet box not furnished.) Write for complete information.

Write P. O. Box 692 for Free Catalog

KEES

F. D. KEES MFG. CO. BEATRICE NEBRASKA

There are PLUS VALUES for YOU in the PAINE line of Hanging and Fastening Devices:

ONE SOURCE. Saves you time, inventory and freight costs.

TOP QUALITY and job-right design make satisfied users.

GOOD PACKAGING — Strong, colorful cartons, clearly labelled.

CUSTOMER DEMAND stimulated with attention-getting ads like this ➔

For a Quick Way to Hang Fluorescent Fixtures use PAINE "King Size" TOGGLE BOLTS



Where hollow ceilings present a problem (e.g. steel ceiling in stores) Paine "King Size" Toggle Bolts are the answer. Their extra-wide wing spread — up to 4" — distributes weight and insures a tight, permanent fastening. Available with 10-24 or ¼"-20 bolts in a range of lengths and styles.

Send for complete catalog

the best craftsmen always take PAINE'S

THE PAINE COMPANY, 6 Westgate Road, Addison, Illinois



ANSWERING QUESTIONS on electric motor maintenance at 9th annual plant maintenance and engineering conference, Palmer House, Chicago, is M. J. Wohlgemuth, service dept., apparatus division, Westinghouse Electric Corp., East Pittsburgh, Pa. Mr. Wohlgemuth was the main speaker at the motor maintenance session.

tion in Seattle of National Electrical Week. Puget Sound Chapter of NISA's booth at the city's Civic Auditorium was the scene of much activity as the group's members distributed lists of member shops along with literature explaining the independent service shop story.

• • • •

Speakers at the joint meeting of King Coal and St. Louis chapters, held in St. Louis on Feb. 21 were: Ward M. Hanson, Electrical Products Research laboratory of 3-M Co.; Al Kutin, director of P. D. George Co.'s research laboratory; J. J. Thomas of the motor engineering department, and G. R. Rohlfing, supervisor of unit substation transformers of Wagner Electric Corp.

• • • •

Little Rock, Ark., is the scene of a meeting of Mid-South Chapter on March 14, 15. It is the organization's foremen's meeting, and there will be prizes for shop ideas submitted in the chapter's annual contest. Winning ideas will be forwarded to NISA headquarters for inclusion in the national Ideas Contest.

• • • •

Al Mulcahy of Holyoke, Mass., and Samuel Heller of American Rectifier Co. occupied the platform before the Connecticut Chapter on Jan. 9 at Waverly Inn, Cheshire, Conn. The subject, of course, was rectifiers — construction, application, selenium brakes, variable speed units, etc.

• • • •

Happy birthday to Milton H. Eisenhardt, treasurer of Quaker City, was the theme of the Jan. 8 meeting of the group at Beck's, Philadelphia. The popular officer



NORTH DAKOTA contractors enjoy break during NDECA business session at Upper Midwest Electrical Industry Convention in Minneapolis. They are (L to R): Earl McGrath and E. R. Ferguson, McGrath Electric Co., Lakota, N. D.; and Lincoln Anderson, Anderson Electric Co., Lawton, N. D.

of the chapter was feted by some 50 fellow members.

• • • •

A topic of continual interest to businessmen, property ownership, comprised the theme of the February 11 meeting of Los Angeles Chapter. Norman Woest of a local title insurance firm, showed films and introduced Arthur Bowman, an associate, who spoke on various problems involving estates, wills and joint tenancy.

• • • •

Another NISA chapter, Quaker City, has held an ideas contest. Ralph Kufen was judge of the event which took place on Feb. 12. Entries were then forwarded to the national Ideas Contest.

• • • •

Ninety-two attended the January 14 meeting of Central Dis-

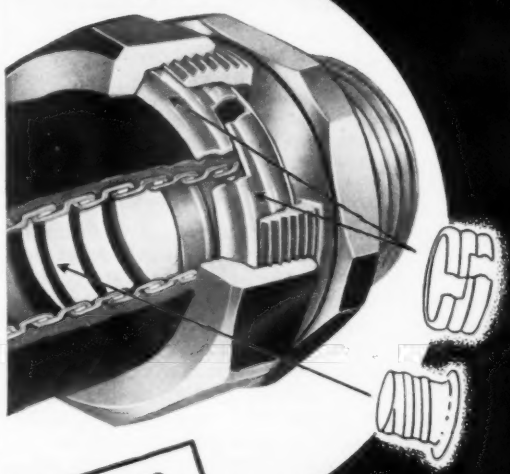


MAINTENANCE CHIEFS at motor upkeep session at plant maintenance conference in Chicago included (L to R): Paul F. Koch, branch chief, maintenance installation and repair, Chemical Research and Development Command, Chemical Corps, U. S. Army, Ft. Detrick, Frederick, Md.; and J. A. Felt, maintenance superintendent, Madison Newspapers, Inc., Madison, Wis.

IDEAL SIMPLET

VAP-OIL-TITE CONNECTORS

For Liquid-Tight Flexible Metallic Conduit



The ONLY completely REUSEABLE connector

EASY TO APPLY

SEAL OUT DUST, VAPOR, OIL, WATER

- provide permanent wiring protecting, yet can be removed for use elsewhere
- adjust quickly to conduit size variations
- grounding bushing assures positive ground
- flange covers raw ends of conduit
- no guess-work, you can see that bushing seats all the way for perfect seal

Exposed parts all *non-corrosive* metal, Vap-Oil-Tite Connectors have positive ground . . . tapered threads . . . and tremendous gripping power through serrations on split ring. Underwriters' Laboratories, Inc. approved with 200 lb. pull test. Fit both EF and UA conduit.

SEE YOUR WHOLESALER, *or send coupon*

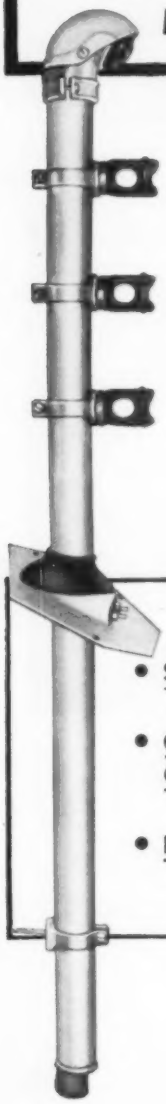
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Your Name_____

Be Sure!
INSTALL
PORCELAIN PRODUCTS
"Sure Seal"
Mast Kits



- STRONGER
- COMPLETE IN ONE PACKAGE
- ECONOMICAL



Send for NEW Mast Kit Brochure

64 years
Electrical Porcelain Since 1894.
PP INC.
Porcelain Products, Inc.
CAREY, OHIO



SOUTH DAKOTA Electrical Council officers are (L. to R): president—James Gibbs, Tri-State Electrical Co., Sioux Falls; secretary-treasurer—W. H. Peterson, rural electrical specialist, South Dakota State College, Brookings; vice president—H. G. Sand, electrical contractor, Brookings, S. D.

trict Chapter of NISA in Chicago. Officers for the coming year include: President, Abe Marcus of Ther Electric Machinery Co., Chicago; vice president B. V. Ferrari of Excel Electric Service Co., Chicago; secretary, John P. Wynant of Wynant Electric Service, Pontiac, Ill.; treasurer, H. W. Reeve of Inland Industrial Electric Service, Chicago; directors for three years, W. L. Kaska, Chicago Electric Co. and A. J. Lewus, Lewus Electric Co., both Chicago.

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The latest NISA publication is a Chapter Officers' Bulletin, mailed periodically by chapter affairs chairman J. Arthur Turner Jr. of Tampa (Fla.) Armature Works.

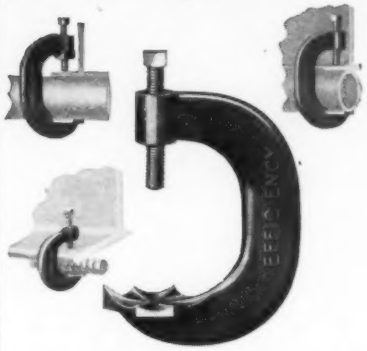
NECA Panhandle Chapter Elects Officers

The Panhandle Chapter of National Electrical Contractors Assn. has elected, as president, George E. Broome of Broome Electrical Construction Co., Amarillo, Texas. Mr. Broome is a charter member of the Panhandle Chapter.

Also elected were C. S. Williams, Jr., Clarendon (Texas) Electric Co., first vice president; Earl Potter, Amarillo (Texas) Electric Co., treasurer; and Elmo Duke, Duke Electric Co., Amarillo, member of NECA board of governors.

Local chapter directors include Robert E. Burns, Davis Electric Co., Pampa; Fred P. Brien, Brien Electric Co., Amarillo; and J. C. Wilson, Wilson Electrical Service Center, Amarillo.

EFFICIENCY
CONDUIT HANGERS *for* **GAS · CABLE** *and* **AIR LINES**



On Steel Construction, "Type F" hangers are best for carrying ½ to 2½ pipe and armored cable at any angle to beams.

EFFICIENCY
ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO

Sound Powered TELEPHONES work in any emergency



because they NEED NO CURRENT

If everything else fails, these phones will still provide trouble-free performance over a distance of many miles. Speaking is activated solely by the sound energy of the voice while ringing is accomplished by a hand-driven magneto. For permanent installation on industrial projects or for temporary use on construction work where they can be moved as the job progresses.

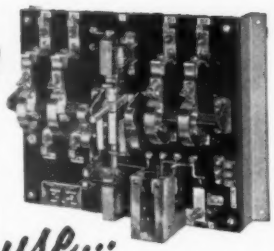
INDOOR AND OUTDOOR MODELS

In selective or common ringing and semi-selective or common talking. Cost of upkeep is negligible.

Write for illustrated catalog

HOSE-McCANN TELEPHONE CO., INC.
761 THIRD AVENUE
BROOKLYN 32, N. Y.

FOR *POWER* THAT'S ALWAYS ON THE JOB



use...

ZENITH

AUTOMATIC TRANSFER SWITCHES

Zenith Automatic Transfer Switches assure full protection against *any* failure of regular voltage. Transfer to emergency power in a fraction of a second is automatic at 70% of line voltage. Regular power is restored at 90% of line voltage.



Simple design . . . sturdy construction . . . switches lock mechanically through trouble-free toggle action . . . no springs, latches or delicate mechanisms.

Available electrically or mechanically held, 30 to 400 amps.

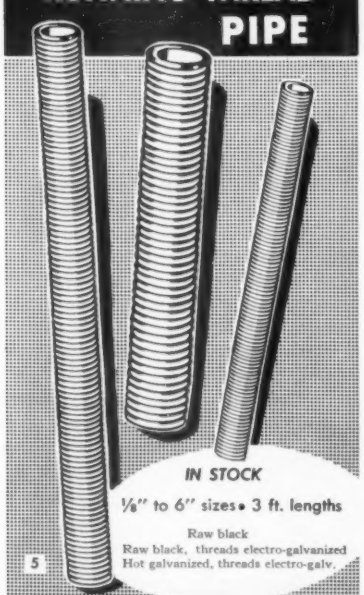
Send for free catalog on complete Zenith line.

ZENITH ELECTRIC CO.

155 WEST WALTON STREET • CHICAGO 10, ILL.

RIGID *Conduit*

RUNNING THREAD PIPE



IN STOCK

⅛" to 6" sizes • 3 ft. lengths

Raw black

Raw black, threads electro-galvanized

Hot galvanized, threads electro-galv.

5

CONDUIT NIPPLE MFG. CO.

1455 SPRING GARDEN AVE. PITTSBURGH 12, PA.

D. Paul Troisi Wins "Look" Award

D. Paul Troisi, Williamsport, Pa., received the Sales Promotion Award for Electrical Contractors in the annual adequate wiring competition sponsored by "Look" magazine. Also, in the electrical contractor division Honorable Mention plaques were given to Berkshire Electric Service Co., Buffalo, N. Y. and Bond Electric Service, Norwood, Ohio.

The awards were presented to the 1958 winners on February 20 at the 14th Annual Conference of the National Wiring Bureau at the Statler Hotel in Detroit.

This annual competition was inaugurated four years ago.

Other winners of the trophies were—

Niagara Mohawk Power Corp., Albany, N. Y., Community Service Award for Utility Companies (over 250,000 meters).

Dayton Power and Light Co., Dayton, Ohio, Community Service Award for Utility Companies (under 250,000 meters).

Farrell-Argast Electric Co., Indianapolis, Ind., Merchandising Achievement Award for Electrical Distributors.

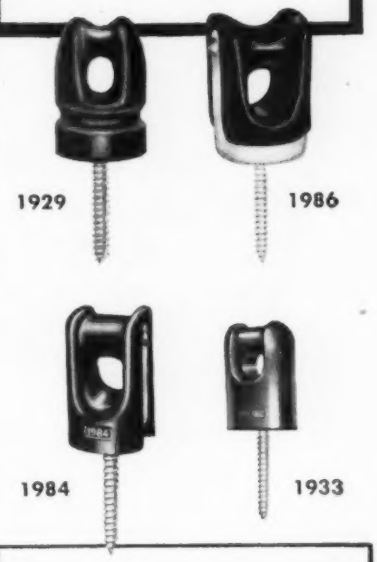
Plaques denoting special citations for outstanding achievement in the field of adequate wiring were presented to Stan Sayre, electrical inspector of St. Paul, Minn., and to the Bureau of Home Appliances of San Diego County, San Diego, Calif. Honorable Mention plaques were given to six utility companies in Hartford, Conn.; Mineola, N. Y.; Greensburg, Pa.; Cedar Rapids, Iowa; Butte, Mont.; and Bridgeport, Conn.



OFFICERS OF the North Dakota Electrical Contractors Association are (L to R): vice president—John Selle, Marshall Wells Store, Fortuna, N. D.; president—Norman Ekblad, Ekblad Electric, Williston, N. D.; and secretary-treasurer—Ben Barnard, North Dakota State School of Science, Wahpeton, N. D.

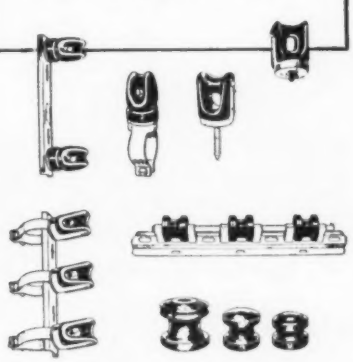
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the most complete, quality line of Porcelain



- **Uniform high quality**
- **Competitive pricing**
- **Dependable service**
- **Up-to-date packaging**

A complete, quality line of secondary service materials



64 years

Electrical Porcelain Since 1894.

PP INC.

Porcelain Products, Inc.

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HIGH AIR VOLUME

AT LOW COST

with "BUFFALO"

PACKAGE PROPELLER FANS



- Rugged, Long-Lasting Design Features
- Low Maintenance Cost
- Low Installation Cost
- Low Operating Cost
- Low Initial Cost
- Quiet, Efficient Ventilation

For low-cost ventilation and exhaust in commercial and industrial jobs, you can't beat "Buffalo" Propeller Fans. "Buffalo" offers a complete line to suit the broadest range of requirements . . . from a small room to a large plant: sizes 24" thru 120" deliver 5,000 to 250,000 cfm. Shipped *completely assembled*, ready to install and operate. Write for Bulletin FM-315 and prices.

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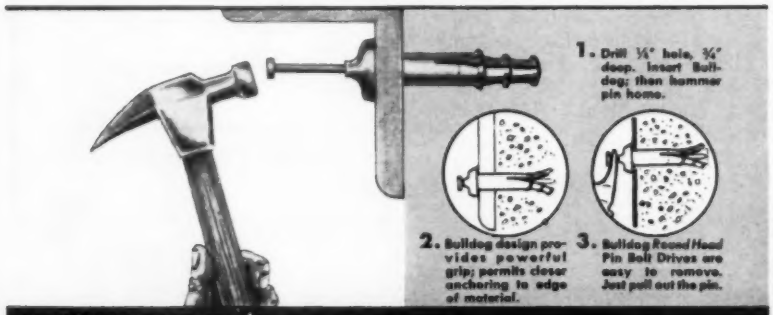
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INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

NEW QUICK WAY TO CUT ANCHORING COSTS!



BULLDOG THE ORIGINAL PIN BOLT DRIVE | ideal for furring, casements, conduits, awnings . . . *you name it!*

- Use Bulldogs in brick, concrete, tile, wood, or most any masonry block.
- Plated steel throughout. Special hardened steel drive pin.
- Choice of 3 types—Round (removable), or permanent Flat Head for finish work and Stud type (not shown). Lengths ¾" to 2"—all ¼" diameter.



SAVE TIME, LABOR AND DOLLARS

See your Supplier . . .
Send for FREE SAMPLE

THE GRIP THAT NEVER FAILS

J.D. POLIS Manufacturing Co.

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DATES AHEAD

First National Lighting Exposition — Coliseum, New York City, March 9-12.

Electrical Contractors Assn. of Ontario —London Hotel, London, Ontario, Canada, March 20-22.

International Association of Electrical Inspectors—Georgia Chapter, Daniel Ashley Hotel, Valdosta, Ga., March 24-25; **South Carolina Chapter,** Columbia Hotel, Columbia, S. C., April 3-4; **Ellis Cannady Chapter,** Carolina Hotel, Raleigh, N. C., April 8-9; **Alabama Chapter,** Hotel Stafford, Tuscaloosa, Ala., April 17-18; **Tennessee Chapter,** Andrew Jackson Hotel, Nashville, Tenn., April 21-22; **Five Chapter Joint Meeting,** Angelina Hotel, Lufkin, Texas-Baton Rouge, George Welman, North Louisiana-East Texas, Texas and Texas Gulf Coast Chapters—May 2-3; **Florida Chapter,** Cherry Plaza Hotel, Orlando, Fla., May 8-10; **Virginia Chapter,** Ingleside Inn, Staunton, Va., May 12-13; **Western Section,** Sheraton-Cadillac Hotel, Detroit, Mich., September 7-10; **Northwestern Section,** Billings, Mont., Sept. 15-17; **Southwestern Section,** Southern California, September 22-24; **Canadian Section,** Montreal, Quebec, Canada, October 10-11; **Eastern Section,** October 13-15; **Southern Section,** Miami, Fla., October 20-22.

Edison Electric Institute — Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 25-27.

Electrical Industry Show and Electrical Maintenance Conference—Shrine Exposition Hall, Los Angeles, Calif., March 27-29.

Illuminating Engineering Society — **Northeastern** Conference, Statler Hotel, Hartford, Conn., April 10-11; **East Central** Conference, John Marshall Hotel, Richmond, Va., April 14-15; **South Central-Southeastern** Conference, Lafayette Hotel, Little Rock, Ark., April 24-25; **Southwestern** Conference, Washington Youree Hotel, Shreveport, La., April 28-29; **Midwestern** Conference, Hotel President, Kansas City, Mo., May 1-2; **Inter-Mountain** Conference, Whitman



J. O. O'CONNER, Luppen and Hawley, Inc., Sacramento, Calif., a past vice president of NECA, was a busy participant at the last NECA convention in Cincinnati.



EAGERLY AWAITING motor maintenance session at plant maintenance conference in Chicago are (L to R): Victor Kaminsky, construction engineer, Minerals & Chemical Corporation of America, McIntyre, Ga.; J. H. Bailey, operations and maintenance dept., Freeport Sulphur Co., Port Sulphur, La.; and J. L. Ward, maintenance supervisor, Better Monkey Grip Co., Dallas, Texas.

Hotel, Pueblo, Colo., May 8-9; **South Pacific** Conference, El Cortez Hotel, San Diego, Calif., May 12-13; **Pacific Northwest** Conference, Multnomah Hotel, Portland, Ore., May 22-24; and **Great Lakes** Conference, Sheraton Hotel, Rochester, N. Y., June 23-24.

Rocky Mountain Electrical League—Annual convention, Shirley Savoy Hotel, Denver, Colo., April 13-20.

National Association of Lighting Maintenance Contractors—Annual meeting, Hotel Statler, Cleveland, Ohio, April 28-30.

National Industrial Assn. — 25th "Jubilee Celebration," Hotel Roosevelt, New Orleans, La., May 11-14.

National Fire Protection Assn. — Annual meeting, Palmer House, Chicago, Ill., May 19-23.

National Association of Electrical Distributors — 50th annual convention, Civic Auditorium, San Francisco, Calif., June 9-13.

Edison Electric Institute — Annual convention, Convention Hall, Boston, Mass., June 9-12.

New York State Assn. of Electrical Contractors & Dealers, Inc.—Annual convention, Whiteface Inn, Lake Placid, N. Y., June 29-July 4.

Illuminating Engineering Society — National Technical Conference, Toronto, Canada, August 17-22.

International Association of Electrical Leagues—Annual Conference, Washington, D. C., October 1-3.

National Electrical Manufacturers Assn. — Annual conference, Hotel Traymore, Atlantic City, N. J., November 10-14.

National Electronics Conference, Inc. —Hotel Sherman, Chicago, Ill., October 13-15.

National Electrical Contractors Assn. —Annual convention and National Electrical Exposition, Adolphus Hotel, Dallas, Texas, November 16-21.

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Among the Manufacturers

Headquarters Announcements

Eagle Electric Mfg. Co., Inc., has purchased the entire assets of the Matol Corp. of Tilton, N. H., manufacturers of metal socket shells and caps.

Silvray Lighting, Inc., Bound Brook, N. J.—Frederick A. Bohn, assistant vice president.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—W. F. Eagan, chief engineer, control department.

General Switch Co., Brooklyn, N. Y.—Stephen Chaika, vice president in charge of sales.

Thomas A. Edison Industries, Storage Battery Div., West Orange, N. J.—Robert H. Weeks, Jr., vice president and division manager.

Acme Electric Corp., Cuba, N. Y.—William E. Bryan, sales manager of Custom Equipment Section.

Kerite Co., New York—Ralph B. Norton, chief engineer.

Crouse-Hinds Co., Syracuse, N. Y.—Charles W. Sanford, vice president—manufacturing.

H. K. Porter Co., Inc., New York—Fred W. Elliott, vice president.

Robertshaw-Fulton Controls Co., Richmond, Va.—A. W. Beck, vice president of marketing.

John A. Roebling's Sons Corp., New York—William C. Ridge, vice president—production.

Metals & Controls Corp., Attleboro, Mass.—John F. Wilson, vice president in charge of sales.

Chrysler Corp., Dayton, Ohio—Paul W. Wyckoff, vice president in charge of engineering for the Airtemp Division.

Thomas & Betts Co., Elizabeth, N. J.—Karl G. Kempf, vice president in charge of Sta-Kon Div.; H. Chester Moses, Jr., vice president in charge of Western Division and also responsible for Pacific Coast Division; C. A. Biddulph, vice president in charge of the Eastern Division; Carroll A. Badeau, administrative vice president and chief engineer.

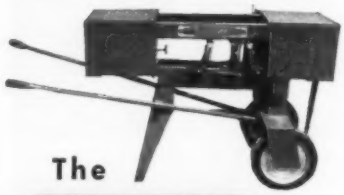
Sylvania Electric Products Inc., N. Y.—Dr. Bennett S. Ellefson, vice president, engineering and research, as well as overall responsibility for Research Laboratories.

Sylvania Lighting Products Inc., Salem, Mass.—Frank J. Healy, president; Henry F. Callahan, vice president — lighting products; O. Howard Biggs, vice president —engineering; Garlan Morse, vice

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MID-SESSION huddle during annual meeting of the Minnesota Electrical Association in Minneapolis finds contractors (L to R): Lloyd Deal, Campbell; J. A. Holt, Henning; and V. P. Dalager, Morris, selecting an Association director from their district.

president—lighting sales; George C. Conner, vice president—photolamp sales.

Regional Appointments

NEW ENGLAND

Ampere Industries: Frank Seeley, sales representative in Hartford, Conn.

MIDDLE ATLANTIC

Reliance Electric and Engineering Co.: Charles D. Herbert, Eastern Regional Sales Manager to cover Boston, New York and Philadelphia.

Electro Silv-A-King Corp.: N. E. Nass, district manager in West Virginia and western Pennsylvania (excluding Erie).

Litecraft Mfg. Corp.: Sidney Sheldon, New York district sales manager.

Ampere Industries: Lew Conover, representative in Philadelphia; Irving Gottlieb, representative in Buffalo, N. Y.

General Electric Co.: Arthur E. Secker, district manager of new Empire District of Assemblies and Components Sales, covering western New York from Utica to Buffalo and northern edge of Pennsylvania.

Metalcraft Products Co. Inc.: J. P. LaKarnafeaux and John C. Floyd, Springfield, Pa., sales and service representatives for eastern Pennsylvania, Delaware and South Jersey.

Howard Industries: Bernard B. Sachs, Elberon, N. J., district sales manager of New York territory; Joseph Spadafora, head of Philadelphia office.

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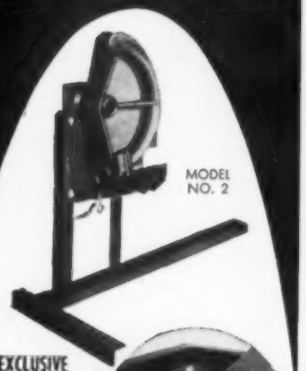
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FOUR MEMBERS of the Illinois Chapter, IAEI, from left to right, Everett Cogan, assistant technical secretary, IAEI, Earl Nelson, National Electric Products Co., W. P. Hogan, chief Electrical Inspector, Chicago, and G. E. Manning, Underwriters' Laboratories, take time to pose for camera before attending afternoon session devoted to code problems and code discussion.

ing Co.: Emory G. Orahood, Southeast Regional Sales Manager covering the Atlanta, Charlotte and Birmingham districts.

Ward Leonard Electric Co.: Roger W. Allen, Atlanta, and J. J. Galleher, Clearwater, sales representatives in Georgia and Florida, respectively.

John C. Virden Co.: Ned P. Walters, sales representative in Alabama, Ga., and Pensacola, Fla.

EAST CENTRAL

National Electric Products Corp.: Earl M. Nelson, assistant to the general sales manager, responsible for trade relations activities in Midwest, headquarters in Chicago; Edgar M. Perrott, Chicago district manager.

Arro Expansion Bolt Co.: C. J. Sampson, St. Louis, sales representative in electrical supply field in eastern Missouri, southern Illinois, and Western Kentucky.

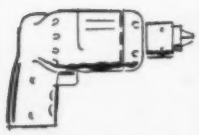
Reliance Electric and Engineering Co.: R. O. Herbig, Central West Regional Sales Manager covering the Chicago and Detroit districts.

Pass & Seymour, Inc.: Glennon D. Kenny, sales representative in Missouri, Arkansas, and western sections of Illinois, Tennessee and Mississippi.

National Electric Products Corp.: Benfield-Detroit Co., sales agent for Surface Raceway Division in Michigan and northwest corner of Ohio.

WEST CENTRAL

National Electric Products Corp: Custer & Co., sales agent for



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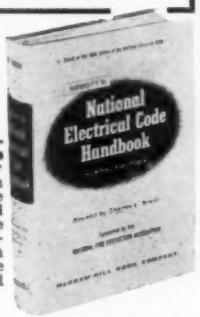
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- Accurate Mfg. Co. 6
- Acme Steel Company 58
- Adam Electric Co., Frank 162, 163
- Allen-Bradley Co. 171, 172
- Allis-Chalmers Mfg. Co. 30, 31, 134
- All-Steel Equipment, Inc. 113
- American Blower Corp. 118
- American Brass Co., The American Metal Hose Branch 48, 49
- American Steel & Wire Div. of U. S. Steel Corp 12, 13
- American Telephone & Telegraph Co. 26
- Amprobe, A Div. of Pyramid Inst. Corp. 157
- Appleton Electric Co. 2
- Arro Expansion Bolt Co. 155
- Arrolet Corp. 176
- Arrow-Hart & Hegeman Elec. Co., The. 106
- Auth Electric Co., Inc. 15

- Bell Telephone System 26
- Benjamin Electric Mfg. Co. 22
- Biddle Co., James G. 119
- Black & Decker Mfg. Co. 203, 219
- Blackhawk Industries 212
- Boston Woven Hose & Rubber Co. 187
- Briegel Method Tool Co. 56
- Brook Motor Corp. 221
- Buffalo Forge Co. 218
- BullDog Electric Products Co. 161
- Burndy Corp. 101

- Century Electric Co. 131
- Champion Lamp Works 160
- Circle F Mfg. Co. 179
- Circle Wire & Cable a Subsidiary of Cerro dePasco Corp. 59
- Clark Controller Co., The 129
- Columbia Cable & Electric Corp. 29
- Conduit Nipple Mfg. Co. 217
- Corning Glass Works 183
- Couch Co., Inc., S. H. 110
- Crescent Insulated Wire & Cable Co. 111
- Crouse-Hinds Co. ..... Fourth Cover
- Cutler-Hammer, Inc. 14

- Day-Brite Lighting, Inc. 140, 141
- Delco Products Div. (General Motors Corp.) 117
- Del-Val Mfg. Co. 210
- Diamond Wire & Cable Co. 53
- Dodge Corp., F. W. 207
- Dossert Mfg. Corp. 61

- Eagle Electric Mfg. Co., Inc. 112
- Economy Fuse & Mfg. Co. 167
- Efficiency Electric & Mfg. Co. 216
- Electrical Construction & Maintenance. 222
- Electric Tube Products 176
- Electro Compound Co. 220
- Exide Industrial Div., The Electric Storage Battery Co. 209

- Fullman Mfg. Co. 178

- Garden City Plating & Mfg. Co. 62
- Gedney Electric Co. 18
- General Electric Co.
  - Apparatus Sales Div. 41, 42, 43
  - Construction Materials Div. 114, 115
  - Lamp Div. 40
  - Wiring Device Dept. 158
- Globe Co., The 192
- Graybar Electric Co., Inc. 68
- Greenlee Tool Co. 144
- Guth Co., Edwin F., The ..... Second Cover, 8

- Helwig Co. 222
- Henderson-Hazel Corp. 220
- Hoffman Eng. Corp. 221
- Holub Industries, Inc. 213
- Hose-McCann Telephone Co., Inc. 216
- Hubbell Inc., Harvey 153, 154
- Huenefeld Co., The 184

- Ideal Industries, Inc. 121, 130
- Ideal-Simplet Fittings, Inc. 215
- Ilsco Corp. 159
- Insul-8 Corp. 186
- International Register Co. 210
- I-T-E Circuit Breaker Co.
  - R & I E Equipment Div. 28
  - Small Air Circuit Breaker Div. 181
  - Switchgear Div. 60

- Jenkins Brothers 39
- Johns-Manville 64

- Kaiser Aluminum & Chemical Sales Inc. 132, 133
- Kalamazoo Tank & Silo Co. 220
- Kato Engineering Co. 210
- Kees Mfg. Co., F. D. 214
- Killark Electric Mfg. Co. 108, 109
- Koeneman Co., R. A. 223

- Leviton Mfg. Co. 145
- Lidseen of No. Carolina, Inc. 222
- Litecontrol Corp. 37

- M & W Electric Mfg. Co., Inc., The .. 208
- Marlou Lights, Inc. 19
- McGill Mfg. Co., Inc. 32
- McGraw-Hill Book Co. 223
- McPhilben Ltg. Co. 116
- Metalcraft Products Co., Inc. 202
- Micro Switch a Div. of Minneapolis-Honeywell Regulator Co. 52
- Midwest Electric Mfg. Co. 138
- Minerallac Electric Co. 186
- Minneapolis-Honeywell 20, 21
- Minnesota Mining & Mfg. Co. 45
- Murray Mfg. Corp. 66

- National Electric Products 33, 34, 35, 36, 194
- National Price Service 220

- Okonite Co., The 185, 201
- Onan & Sons, Inc., D. W. 206
- Oster Mfg. Co., The 16, 17

- Paine Co., The 214
- Pass & Seymour, Inc. 47
- Phelps Dodge Copper Products Corp. ... 104
- Pittsburgh Standard Conduit Co. 57
- PLM Products, Inc. 219
- Plymouth Rubber Co., Inc. 11
- Polis Mfg. Co., J. D. 218
- Porcelain Products, Inc. 216, 217
- Pyle-National Co., The 38

- Quaker Rubber Div., H. K. Porter Company, Inc. 152

- Ramset Fastening Inc. 211
- Reading Body Works, Inc. 190
- Remcon, A Div. Pyramid Instrument Corp 142, 143
- Remington Arms Co, Inc. 199
- Republic Steel Corp. 24, 25
- Revere Electric Mfg Co. 196
- Ridge Tool Co, The 150, 151
- RLM Standards Institute, Inc 50
- Rockbestos Products Corp. 107
- Rodale Mfg Co, Inc. 195
- Rohm & Haas Co 169
- Rome Cable Corp 205
- Royal Electric Corp 168

- S & C Electric Co. 27
- Sangamo Electric Co. 182
- Simplex Wire & Cable Co. 65
- Slater Electric & Mfg. Co., Inc. 122
- Smithcraft Lighting 193
- Sola Electric Co. 177
- Square D Co. ..... Third Cover 1
- Stampings, Inc. 175
- Standard Transformer Co, The 204
- Steel & Tubes Div. 24, 25
- Sylvania Electric Products, Inc. 102, 103, 174

- Thomas & Betts Co., The 51
- Thompson Electric Co., The 188
- Tork Time Controls, Inc. 120

- Union Metal Mfg. Co., The 166
- United States Rubber Co. 23
- Up-Right Scaffold Co. 46
- Uptegraff Mfg. Co., R. E. 148, 149

- Wadsworth Elec. Mfg. Co., Inc., The .. 208
- Wagner Electric Corp. 128, 189
- Walker Bros. 146, 147
- Westinghouse Electric Corp.
  - Lamp Div 156
  - Pittsburgh 54, 55, 63, 123, 124, 125, 126
- Wheeler Reflector Co 191
- Where To Buy 223
- Wiegand Co., Edwin L. 164, 165
- Wiley Inc, R & W. 200
- Winpower Mfg. Co. 212
- Wiremold Co., The 170

- Youngstown Sheet & Tube Co., The ... 44

- Zenith Electric Co. 217

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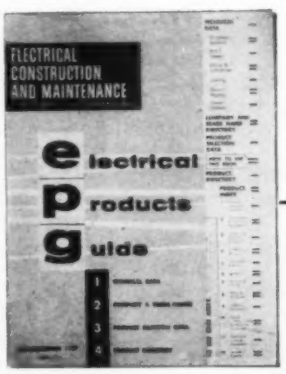
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES ... 223

EQUIPMENT

(Used or Surplus New)

For Sale 223



• These manufacturers advertised their products in the ELECTRICAL PRODUCTS GUIDE

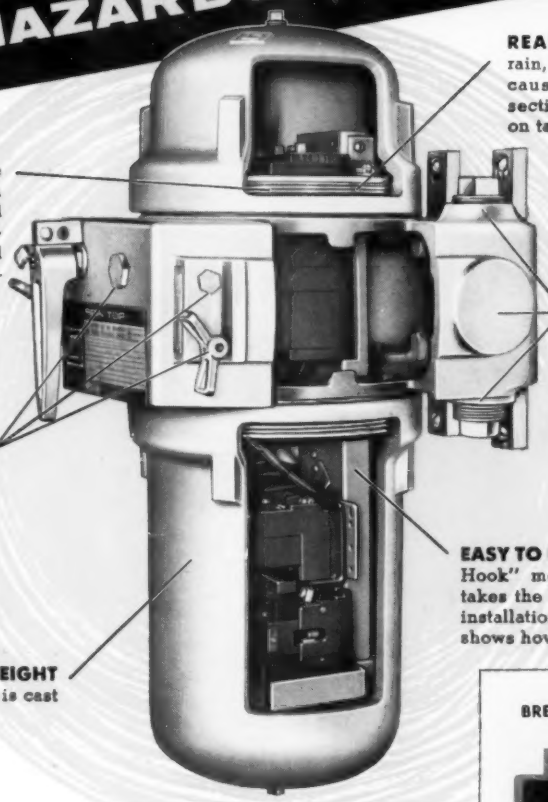
For more complete information, and application data on their lines, refer to the index of Advertisers in the ELECTRICAL PRODUCTS GUIDE . . . the 13th issue of ELECTRICAL CONSTRUCTION AND MAINTENANCE.

Square D announces...

NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS

REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

DAMAGE-RESISTING Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

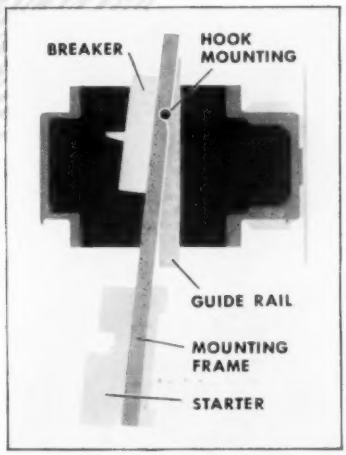


INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

STRONG and LIGHTWEIGHT The complete enclosure is cast aluminum.



SLIDE and HOOK MOUNTING

4 SIZES FOR STARTERS SIZE 0 THROUGH 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G

The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

Write FOR BULLETIN 9990

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

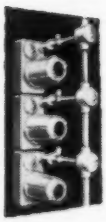
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SQUARE D COMPANY



DANGER!

. . . instantly signaled by Crouse-Hinds *Visularms*®



Condulet Visularms



Condulet Pilot Lights



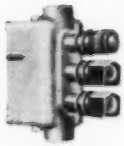




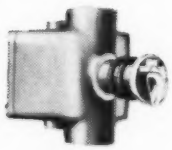
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Condulet Instrument Housings



Condulet Pushbutton Stations



Condulet Selector Switches

In oil refineries, chemical plants, synthetic rubber plants — wherever constant watch of processing is necessary — Crouse-Hinds Condulet® *Visularms* provide visual indication of process conditions, and instant control of manufacturing equipment.

By means of pilot lights (and bell, horn or siren signals where desired) *Visularm* indicates normal or abnormal temperature, liquid level, pressure, or other conditions which can be electrically coupled to the circuit.

Explosion-proof or dust-tight and weather-resistant construction* assures maximum safety in hazardous locations. Compact designs minimize space required on control or panel boards . . . are easy to install.

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Two- or three-light styles may be mounted either vertically or horizontally. For audio warning, any number of *Visularms* may be used to operate a single horn, bell or siren.

Visularms are just one of hundreds of items in process control board equipment offered by Crouse-Hinds. Only a few are shown at left. For full information on the complete line, call your nearest Crouse-Hinds distributor, or write . . .

*Dust-ignition-proof.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

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